

InTime 2025.1

Documentation

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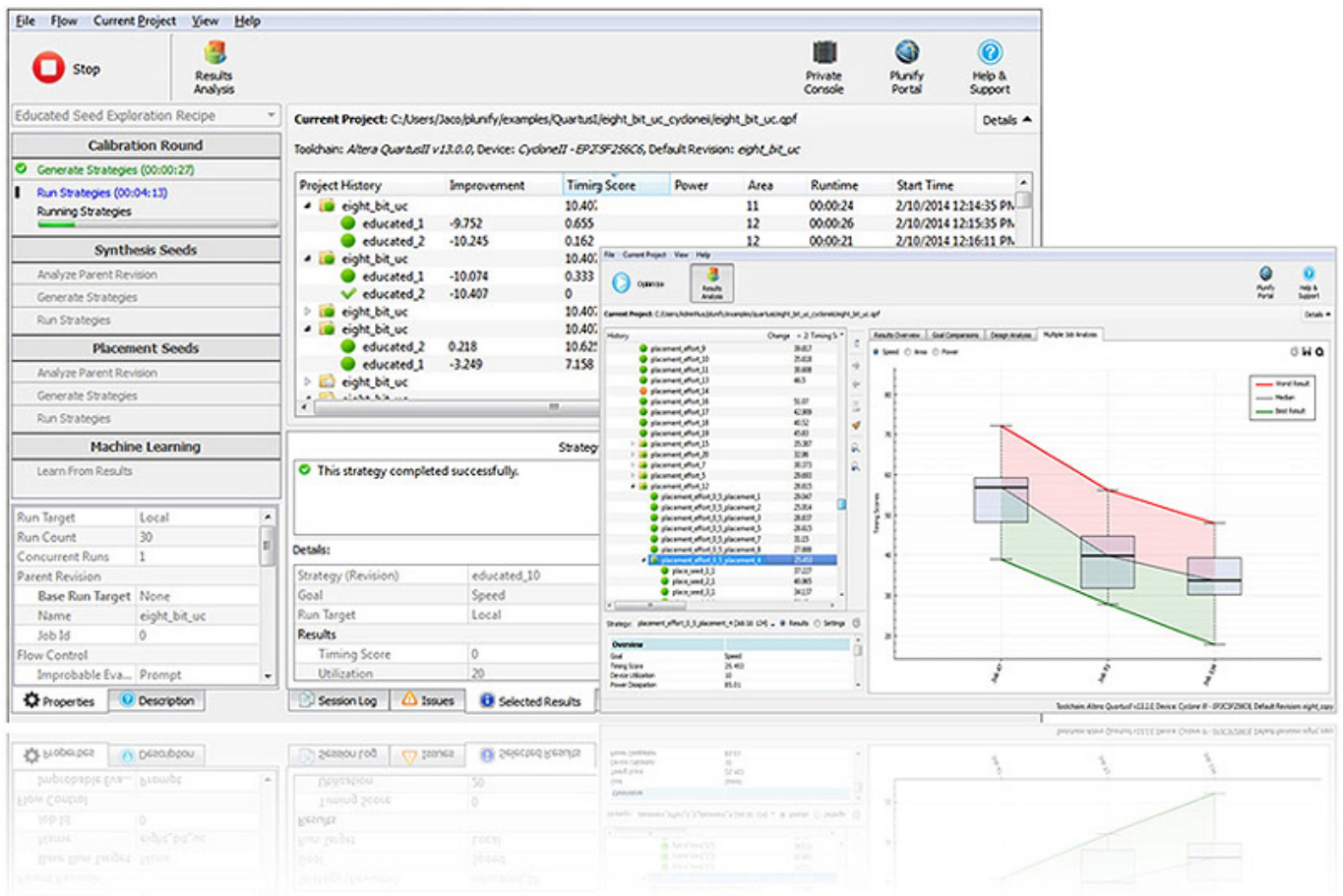
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1. Introduction

InTime is an EDA tool that solves timing, area issues and enhances performance in FPGA designs. Integrating the best of machine learning and years of FPGA optimization experience, InTime provides an easy to use "FAE-in-a-box" experience to address everyday timing and performance issues faced by FPGA users, regardless of their level of FPGA expertise.

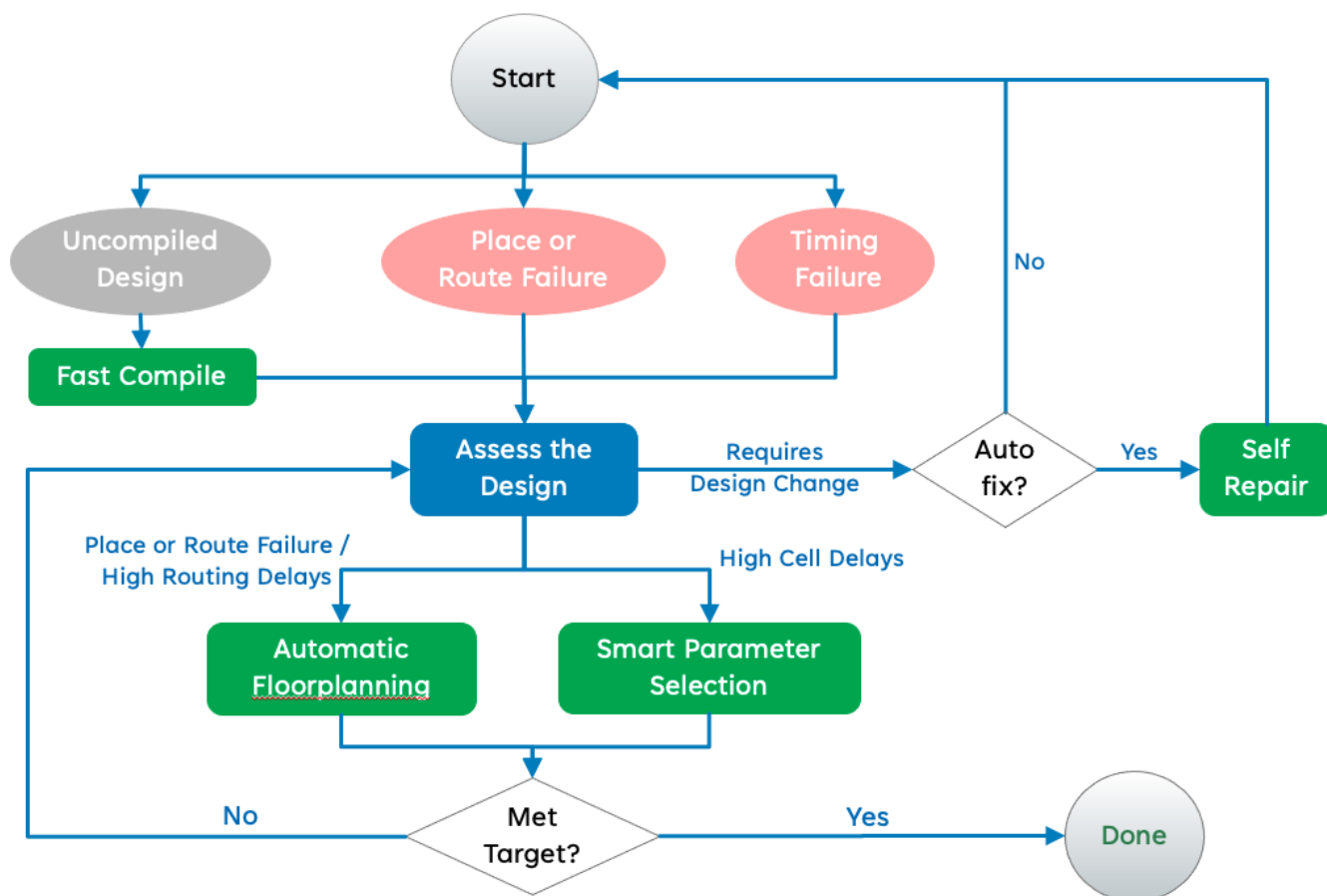
For direct support, please contact us at help@plunify.com.



For the latest release notes, please refer to <https://support.plunify.com/en/intime-release-notes/>

2. The InTime Flow

A typical InTime flow is shown below. The flow's starting point is an FPGA project created separately in an FPGA vendor tool (Vivado/Quartus/Libero) or a generic build script such as a non-project mode script.



2.1 1. Analyze Design

When InTime starts, it detects existing synthesis and place-and-route results for the active revision/run (also known as the **default revision**). Its initial analysis checks whether the design has any timing, placement or routing issues.

Types of Challenges

- Placement or Routing failures
- Timing failures

InTime relies on an initial Design Assessment step to identify and classify design challenges. In order to shorten the overall turnaround time for a design, it is important to diagnose the issues accurately upfront, so that the tool can determine and automatically apply fixes.

 **Note**

Some designs may not be constrained properly, leading to poor quality of results and long runtimes.

In the Self Repair step, InTime will highlight inherent designs issues and prompt the user to fix them before entering the main optimization flow.

If the design has not been compiled yet, the user will be prompted to let InTime build it before proceeding. The default revision then becomes the **parent revision** of the strategy evaluation step. Using the parent revision, InTime generates strategies which are optimized for the design.

 **Note**

In cases where the compilation runtime is too long, the user can choose not to compile the original design and proceed with strategy generation.

2.2 2. Strategy Generation & Learning

When InTime generates strategies, it uses built-in knowledge that is optimized for the design. This knowledge leads to strategies with higher probabilities of improving the design's performance in order to meet design goals.

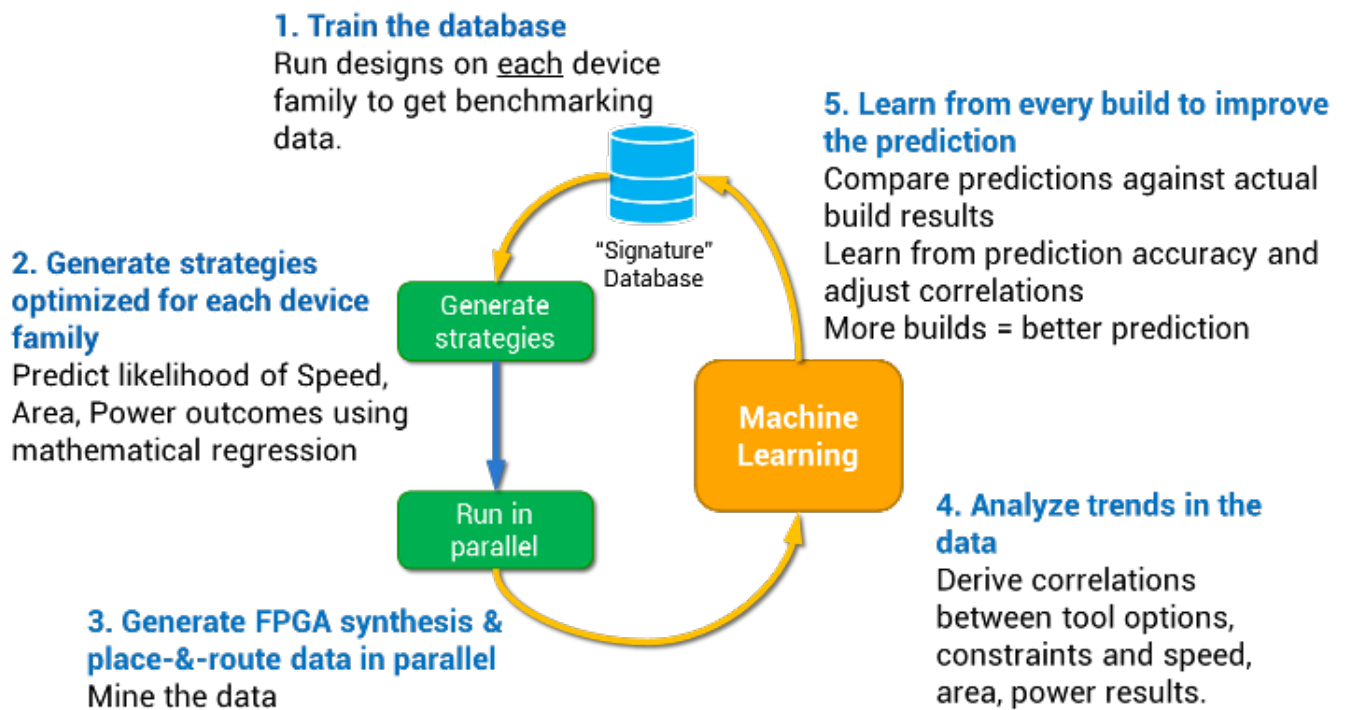
 **Note**

Strategies can consist of timing and location constraints as well as synthesis and place-and-route settings.

Types of Strategies

- Auto Floorplan: Floorplanning constraints for critical logic.
- Smart Parameter Selection: Synthesis, place-and-route settings and timing constraints.

The diagram below shows how this process works and how it becomes smarter and better.



2.3 3. Bringing It Together

Once all strategies have been compiled, InTime determines if the design goals and targets are met. If so, optimization has succeeded. If not, the next iteration of the flow will be started using the best result of the previous iteration as the reference (referred to as the *parent revision* throughout the documentation).

To cater to the needs of a wide range of situations and applications, InTime provides different optimization methods called recipes. These recipes work on different aspects of the design such as synthesis, floorplanning, place and route, overclocking, incremental optimization, tackling high fanout nets and floorplanning.

3. Installation (Single Machine)

InTime can run on a single machine or on multiple servers. This section describes execution on a single server (Refer to Compute Grid to deploy InTime in an environment with multiple build servers).

Note

After installing InTime,

- Node license users: Refer to Configure InTime Client to configure a Node license.
- Floating license users: Refer to Install Floating License Server to install and start a Floating license server.

3.1 Operating System Requirements

- 64-bit architectures only
- Windows 10 above / Ubuntu 20.04 LTS / Ubuntu 22.04 LTS / Red Hat Enterprise 8 and above compatible
- Other versions are supported upon request.
- Operating Systems that have reached End Of Life (EOL) will not be supported.

3.2 Linux Installation

1. Download the installer from <https://cloud.plunify.com/downloads>.
2. Open a command-line terminal. Create the folder to install InTime.

```
$ mkdir -p ~/plunify/intime
```

3. Navigate to the installation folder.

```
$ cd ~/plunify/intime
```

4. Login as the appropriate user and set user execute permissions for `intime_v<version>_64bit_linux.sh`. Run the installer script.

```
~/plunify/intime $ chmod u+x intime_v<version>_64bit_linux.sh

~/plunify/intime $ sh ~/Downloads/intime_v<version>_64bit_linux.sh
Verifying archive integrity... All good.
Uncompressing Plunify InTime version <version>.....
.....
.....
```

5. The script extracts installation files and presents a licensing agreement. Follow the onscreen instructions to accept and proceed.
6. A prompt to install default modules will appear. Hit <Enter> to install all the options.

```
-----
Accept the terms of the Plunify End-User Licensing Agreement ('y' for Yes or 'n' for No)? y
```

```

Thank you, proceeding with installation...

Install default modules (Recommended)? ('y' for Yes or 'n' for No) [y] y
Installing defaults...

Installing 64-bit JRE...

InTime installation complete.

```

Three options for modules

"**Local**" - on a standalone PC where InTime is installed.

"**Private Cloud**" - Over multiple computers in the user's network.

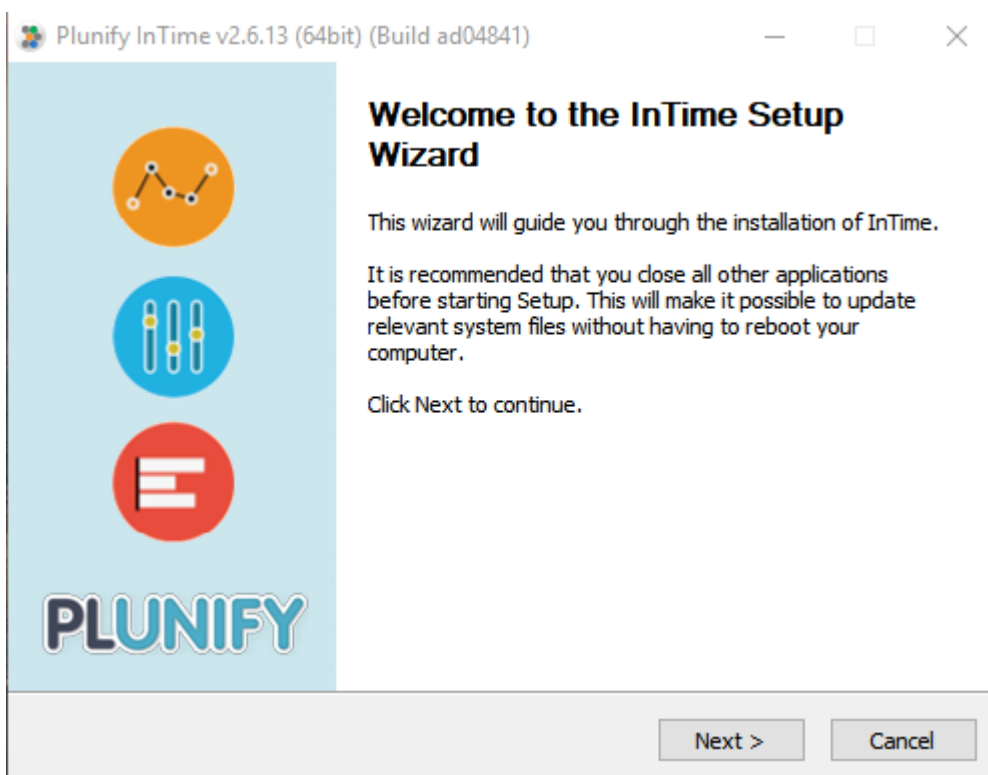
"**Plunify Cloud**" - Using Plunify-managed cloud computing resources.

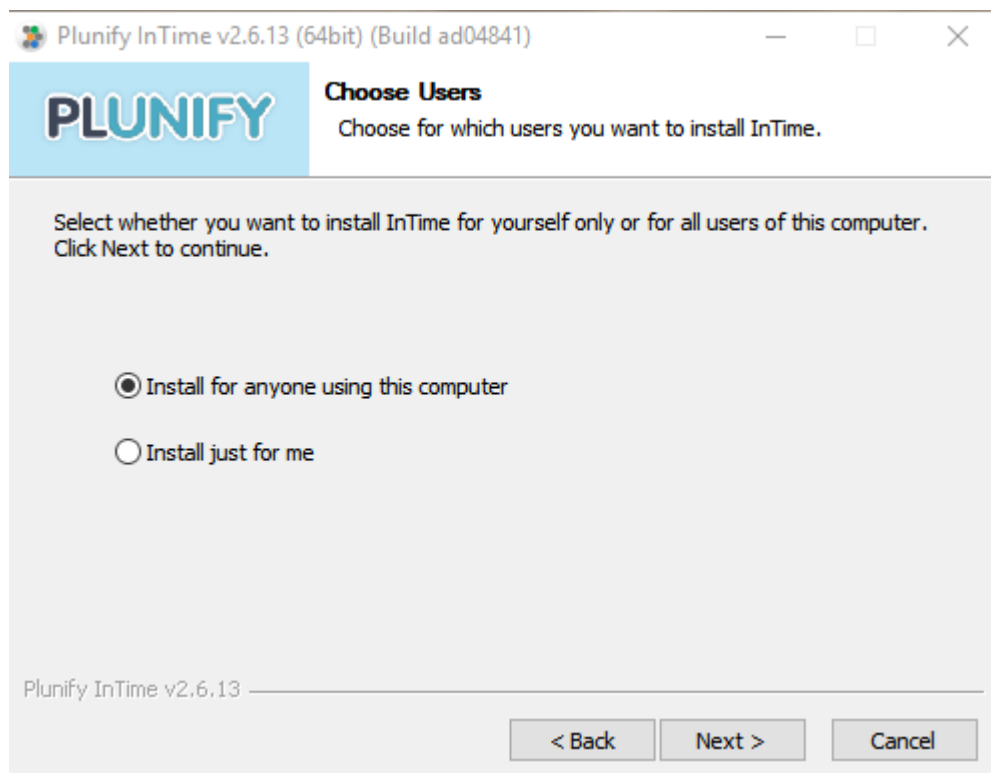
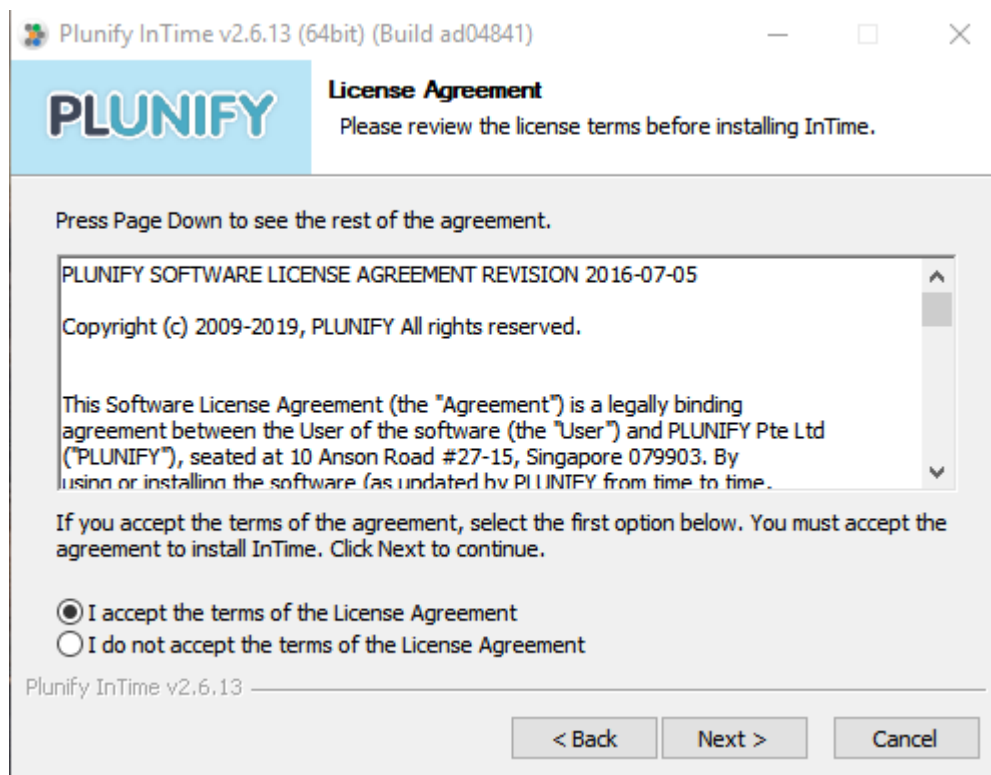
Local is always installed, but the rest are optional. See `run_targets` under Flow Properties for more information on the different options.

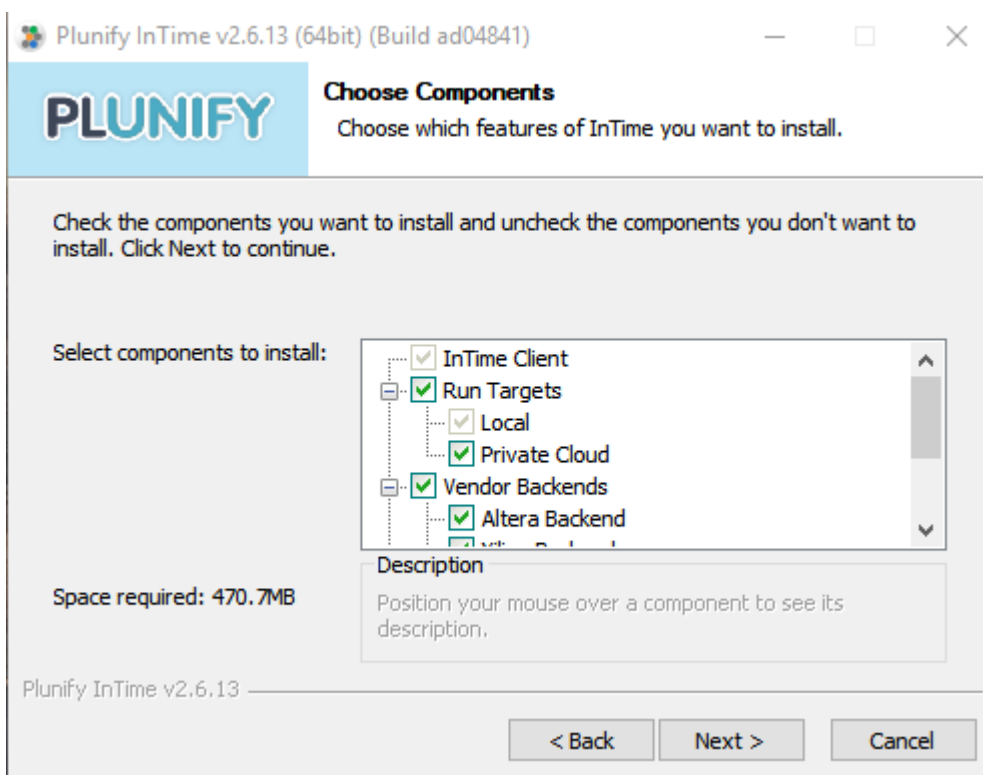
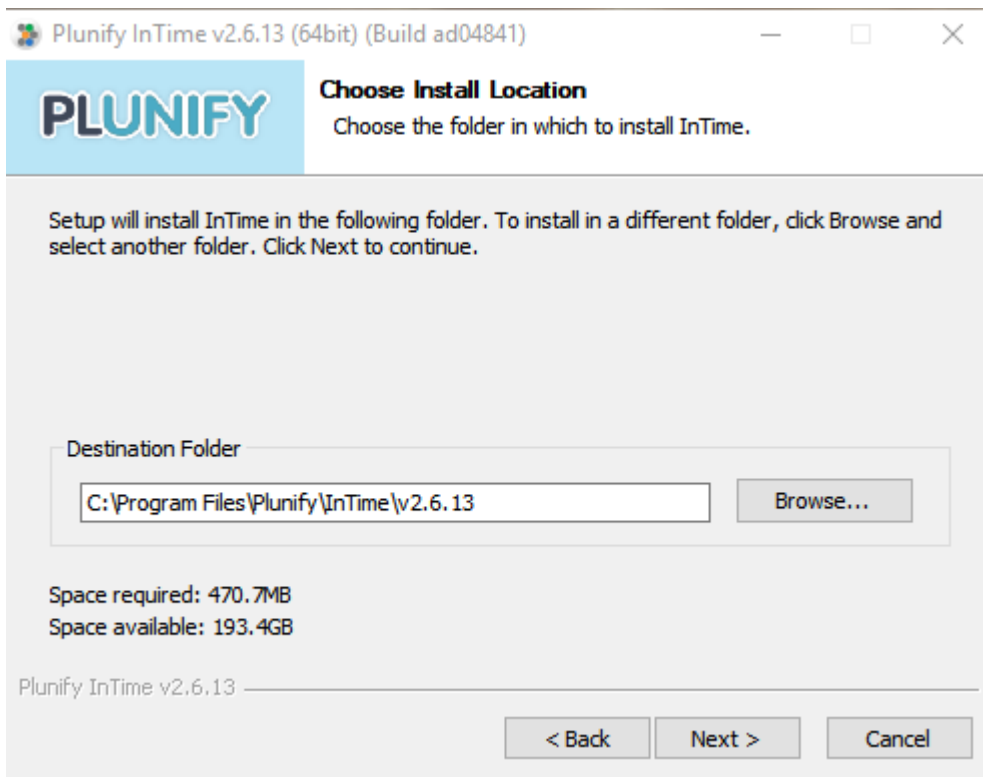
7. Finally, the installer creates InTime-related shortcuts on the user's desktop.

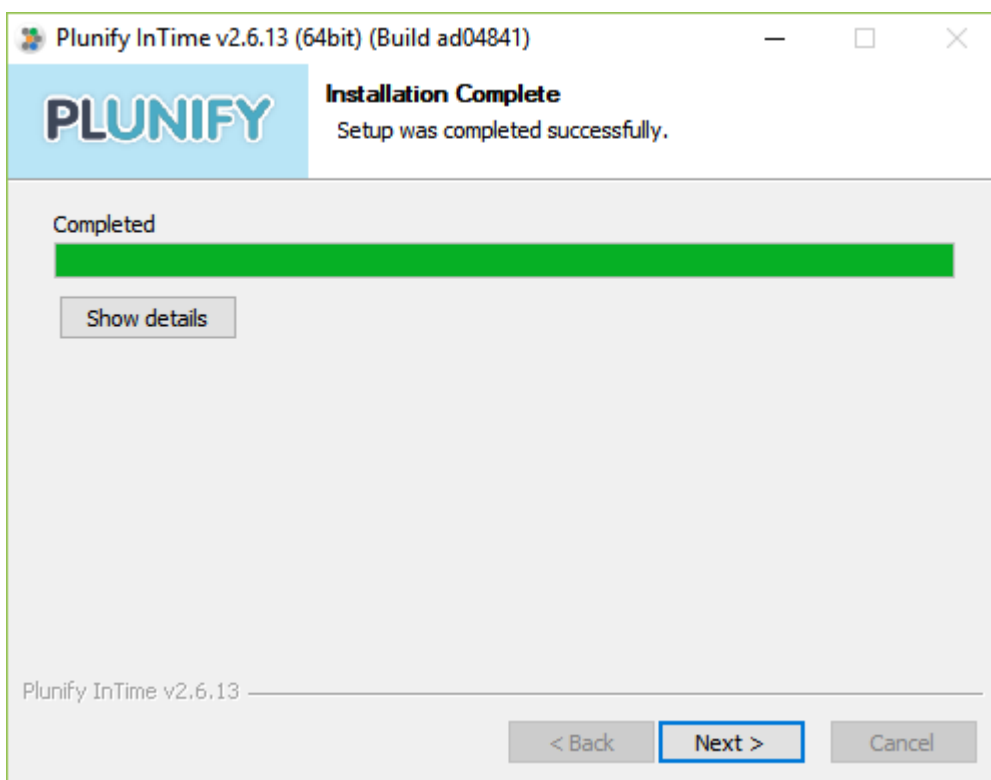
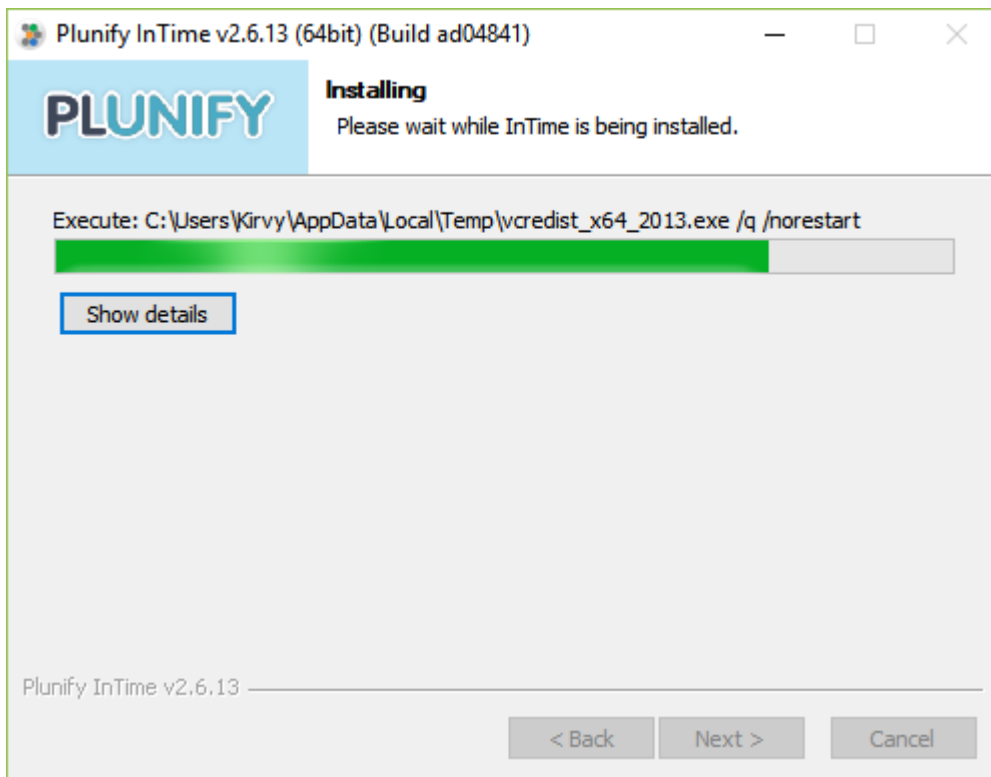
3.3 Windows Installation

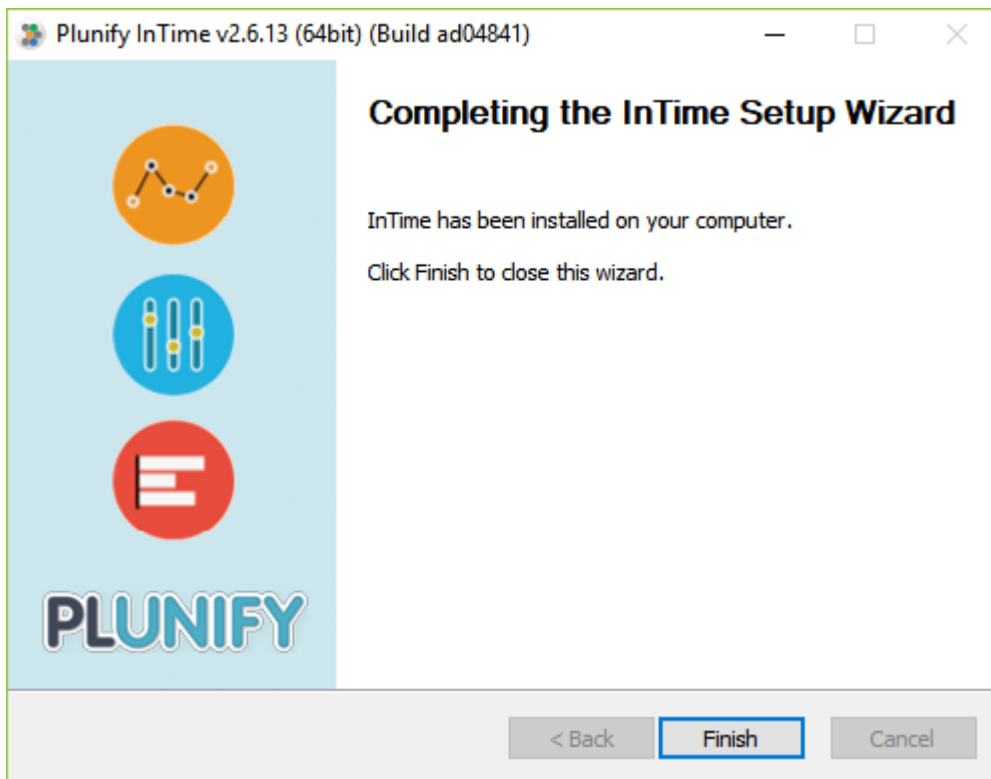
1. Download the Linux installer from <https://cloud.plunify.com/downloads>.
2. Run the installer by double-clicking the downloaded file. The installer wizard contains the following pages which guide you through the installation process. Just follow the process below.











3.4 Unattended Installation

Assuming the InTime version is 3.0.2.

For Windows:

```
C:\Users\Test\Downloads> intime_v3.0.2_64bit_win.exe /AllUsers /S /NCRD
```

For Linux:

```
$ ACCEPT_LICENSE=1 DEFAULT_INSTALL=1 sh intime_v3.0.2_64bit_linux6.sh
```

4. Installation (Floating License)

4.1 InTime/License Server

The InTime Server acts as a license manager to let InTime use a Floating License.

Requirements

- Operating System: 64-bit architecture. Windows 10 / Ubuntu 20.04 LTS / Ubuntu 22.04 LTS / Red Hat Enterprise 8 and above, or compatible.
- *Static* IP address (also supports 127.0.0.1) to communicate with InTime worker processes.
- Network ports
 - Ports 39940, 39941 to communicate with InTime worker processes.
 - Port 39942 for the administrative console.
 - Port 39946 for web-based configuration.

Note

Java is required but InTime will install its own Java 1.8.0 JDK.

4.2 Deploy License Server Separately

Note that it is possible to deploy the License Server separately from the InTime Server. This can be due to administrative reasons. For example, licenses are located on an isolated machine. Another reason to separate the License Server is because the InTime handles file transfer and acts as a file handling manager, therefore it might be better to deploy it on a bigger machine.

To understand how to deploy the license separately, please refer to [How to install License Server and InTime Server separately?](#)

4.3 Linux Installation

Note

Starting from InTime version 2023.2, the Linux version of InTime and its companion InTime Server are merged into a single software package for convenience and ease of installation. Depending on your InTime version, follow the "Bundled" or "Standalone" installation steps below.

Bundled InTime Server

1. Once the InTime software is installed, no further step is needed to install InTime Server. InTime Server files are found in *<InTime installation folder>/server* directory (Linux only).

- The files and directory structure of the `server` folder are the same as those in a standard InTime Server installation. To run InTime Server, create a directory with write access permissions and use the `-wd` argument to point to it.

Warning

Overwriting the files or reinstalling the InTime installer will cause the InTime Server to throw exceptions as files are overwritten. Users need to restart the InTime Server service to resolve the exceptions. The working directory must have sufficient disk space required for the data.

Prerequisite: A folder with write access permissions to serve as InTime Server's working directory.

- Next, start InTime Server with the `-wd` argument pointing to the newly-created working directory.

In the example below, the user creates a new folder called `intimeserver_wd` to designate as InTime Server's working directory, and copies the InTime license, `server.lic`, into it.

```
$ pwd
/home/user
$ mkdir intimeserver_wd
$ cd intimeserver_wd
$ cp /tmp/server.lic .
$ ./start_server.sh -wd /home/user/intimeserver_wd/

----- SHELL SCRIPT VARIABLES -----
SERVERIP 1          = 192.168.2.100

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269
Write permission (plunify.db) [ OK ]
JDBC (plunify.db)           [ OK ]
JDBC (intimeruns.h2.db)      [ OK ]
Starting InTime Server      [ OK ]
Starting License Server     [ OK ]
Starting ACL Server         [ OK ]
License server.lic          [ OK ]
License has started?        [ OK ]
License not expired?        [ OK ]
License Mac 08:00:27:70:A5:E2 [ OK ]
License features            [ OK ]

Admin portal can be accessed at http://localhost:39946/admin

$
```

Standalone InTime Server

Skip this section if you have already completed the "Bundled InTime Server" installation.

- Download the InTime Server installer from <https://cloud.plunify.com/downloads>.
- Login as a privileged user and set user execute permissions for `"intimeserver_v2.7_64bit_linux.sh"`. In this example, the user is `"cadadmin"`, and the installation directory is `"/home/cadadmin/intimeserver/"`.

```
$ pwd
/home/cadadmin/intimeserver/

$ chmod u+x intimeserver_v2.7_64bit_linux.sh
```

Warning

As a security precaution, the "root" user is not allowed to install and run the InTime Server. It is not recommended to install or run any 3rd-party applications as the 'root' user.

1. Run the installer file. Use default options for full installation. For those planning to migrate an existing InTime Server database and configurations from an earlier version, enter the same installation directory to overwrite an current installation.

```
$ ./intimeserver_v<version>_64bit_linux.sh

Verifying archive integrity... 100% All good.
Uncompressing Plunify InTime Server version 2023.1.1 (Build 1234567) 100%

INFO      : Installing to /home/cadadmin/intimeserver

INFO      : Installing 64-bit JDK...

Select installation type: ('1' - Full installation InTime Server/License Server, '2' - License Server only, '3' - InTime Server only) [1]
INFO      : Installing InTime Server/License Server...
INFO      : Completed server type setup.

INFO      : Installing SQLite support (default)...
INFO      : Completed database setup.

Clean up and remove installation files? ('y' - Yes, 'n' - No) [n]
INFO      : Not removing installation files.

Select a JVM (Java Virtual Machine) option:
How to select the JVM option?

Use minimal JVM:
  a. More than 10 Concurrent Runs (parallel compilations).
  b. Project Archive size is 4 GB or more.
  c. InTime Server machine has 4 GB or more RAM.

Use optimal JVM:
  a. More than 6 Concurrent Runs (parallel compilations).
  b. InTime Server machine has less than 4 GB RAM.

Specify JVM option: ('1' - minimal, '2' - optimal) [2]
INFO      : Using optimal JVM configuration by default.
INFO      : Completed JVM setup.

To migrate an existing InTime Server installation, enter the existing installation path: (<Enter> to skip migration)
INFO      : No migration required.
INFO      : Completed migration step.

Specify the license file e.g. server.lic: (<Enter> to skip if you wish to copy the license file manually later)
INFO      : Not automatically installing the license file.
INFO      : Please copy the license file e.g. server.lic to /home/cadadmin/intimeserver/ before running.
INFO      : Completed license file installation step.

InTime Server/License Server installation OK.

Next,
  Make sure that the license file (e.g. server.lic) is in /home/cadadmin/intimeserver/
  Run the following commands in a terminal console:
    cd /home/cadadmin/intimeserver
    ./start_server.sh

$
```

Specify JVM (Java Virtual Machine) options

There are two options: [1] Minimal setting for 1GB of heap space - suitable for running just the License Server; [2] Optimal setting for 4GB of heap space - typically used for running the InTime Server.

**Install License Server and InTime Server on 2 different servers**

To install License Server and InTime Server on 2 or more servers, refer to this webpage for more information.

1. Install license and start the InTime Server. Copy the license file, e.g. *server.lic*, into `/home/cadadmin/intimeserver/` and launch the InTime Server. To launch the InTime Server, run the script `./start_server.sh`.

```
$ pwd
/home/cadadmin/intimeserver
$ ./start_server.sh

----- SHELL SCRIPT VARIABLES -----
PID [OLD]           = 29016
SERVERIP 1          = 192.168.2.100

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269
Write permission (plunify.db) [ OK ]
JDBC (plunify.db)           [ OK ]
JDBC (intimeruns.h2.db)      [ OK ]
Starting InTime Server       [ OK ]
Starting License Server      [ OK ]
Starting ACL Server          [ OK ]
License server.lic           [ OK ]
License has started?         [ OK ]
License not expired?         [ OK ]
License Mac 08:00:27:70:A5:E2 [ OK ]
License features             [ OK ]

Admin portal can be accessed at http://localhost:39946/admin

$
```

**Tip**

To start/restart the Server at a later time, just run `./start_server.sh` again. To shut down the server run `./start_server.sh -stop`

4.4 Check InTime Server Status

```
$ ps -ef|grep java
intime 5700 1 2 07:16 pts/3 00:00:03 /home/caadmin/intimeserver/./jdk/bin/java -Xms512m -Xmx1024m -server -
Dlogback.configurationFile=/home/caadmin/intimeserver/./conf/logback.xml -DINTIMESERVER_HOME=/home/caadmin/intimeserver/. -
classpath /home/caadmin/intimeserver/./intimeserver.jar:/home/caadmin/intimeserver/./lib/* com.plunify.main.InTimeServer -directory /
home/caadmin/intimeserver/./plunify_server -licensefile /home/caadmin/intimeserver/./server.lic -log_level info
```

**Automatically Start Server (Optional)**

To automatically start the InTime Server when a machine boots up, add the following line to `/etc/rc.local`. \$ vi `/etc/rc.local` /bin/su -s /bin/bash -c '/home/cadadmin/intimeserver/start_server.sh' cadadmin

4.5 Windows Installation

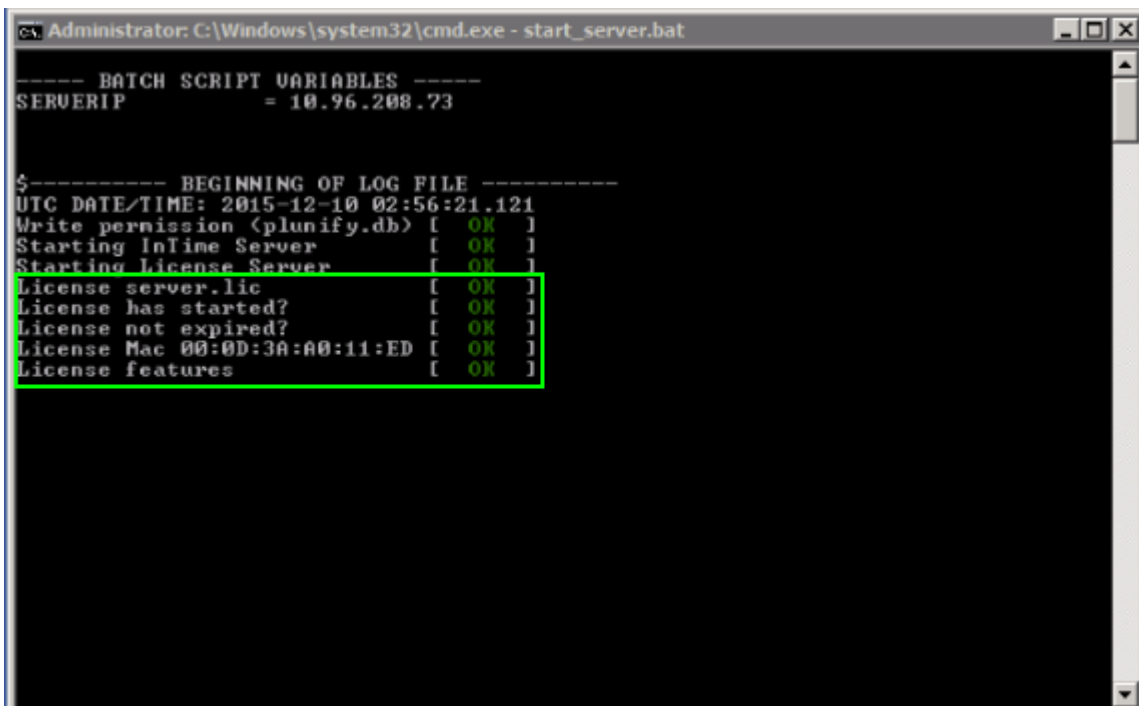
1. Download the (windows) installer from <https://cloud.plunify.com/downloads>.

2. Run the installer by double-clicking it on the machine designated as the InTime server. Select "Full Installation" to install the default. InTime Server will be installed in the default directory `C:\intimeserver`. The installer will attempt to overwrite earlier version of libraries and files, do make sure a backup to this directory before installing.
3. Request a license from Plunify by providing the MAC address of the InTime Server machine. After receiving the license file, for example, `server.lic`, place it in `C:\intimeserver`.
4. Open a command prompt and navigate to `C:\intimeserver`. To launch InTime Server, run the `start_server.bat` script.

Stop and restart

To shut down the server run `start_server.bat -stop`. To start/restart the Server at a later time, just run `start_server.bat` again in another shell.

Please ensure that you see the license acceptance message as shown below



```

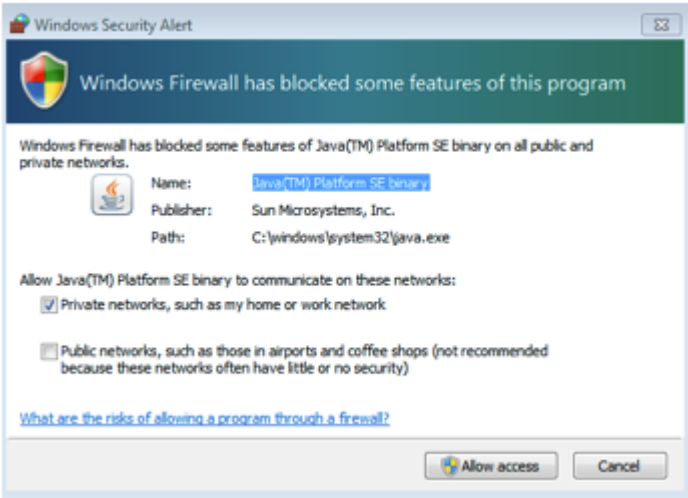
Administrator: C:\Windows\system32\cmd.exe - start_server.bat

----- BATCH SCRIPT VARIABLES -----
SERVERIP      = 10.96.208.73

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-10 02:56:21.121
Write permission <plunify.db> [ OK ]
Starting InTime Server [ OK ]
Starting License Server [ OK ]
License server.lic [ OK ]
License has started? [ OK ]
License not expired? [ OK ]
License Mac 00:0D:3A:A0:11:ED [ OK ]
License features [ OK ]

```

A Windows Security Alert may pop up indicating that a Java binary is running. Click "Allow access" as shown below



4.6 Unattended Installation

Assuming the InTime version is 3.1.2.

Windows: `C:\Users\Test\Downloads> intime_v3.1.2_64bit_win.exe /AllUsers /S /NCRD`

Linux: `$ ACCEPT_LICENSE=1 DEFAULT_INSTALL=1 sh intime_v3.1.2_64bit_linux6.sh`

Similarly, for InTime Server,

Windows: `C:\Users\Test\Downloads> intimeserver_v3.1.2_64bit_win.exe /AllUsers /S /NCRD`

Linux: `$ DEFAULT_INSTALL=1 sh intimeserver_v3.1.2_64bit_linux6.sh`

Argument	Description
DEFAULT_INSTALL	'1' - Full installation InTime Server/License Server, '2' - License Server only, '3' - InTime Server only

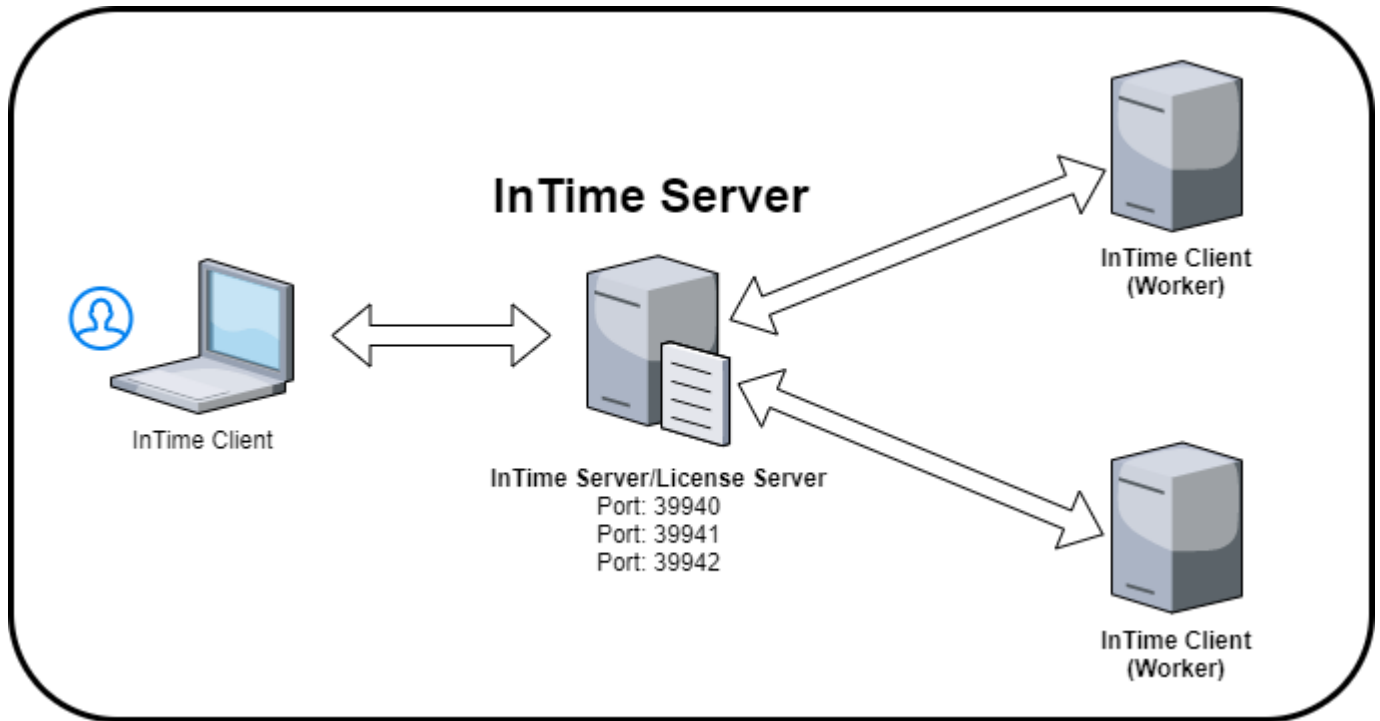
4.7 Typical Job Scenario

This is a scenario of how a project is submitted over the the network to multiple machines.

1. The InTime Agent is launched on multiple remote machines.
2. The user starts an InTime Client. User opens a project and submits a job to the InTime Server. Usually this job has multiple revisions or strategies.
3. The InTime Server accepts this job and assigns a *job ID* to it.
4. The InTime Server queues the job and assigns individual strategy/revision to available InTime Agents.
5. The InTime Agent software will accept the job and start an InTime Worker instance to work on it.
6. Once the InTime Worker has completed their assigned strategy, the results are sent back to the InTime Server.
7. InTime Server will mark the job as completed when all the results are back.
8. InTime client will receive a notification in its next polling request. It will download the results, update the history and complete the job.
9. InTime Agent will exit (if there are no more jobs) in LSF/SGE environment.

5. Installation (Compute Grid)

InTime can be deployed on multiple networked machines or in a server farm. Workload systems, such as LSF and SGE, are supported. Below is a typical deployment scenario for multiple InTime "workers" (see figure below).



5.1 Private Cloud Components

These are the components of a multi-seat configuration.

Roles	Description
InTime Server/License Server	Manages job scheduling, collating results and license management.
InTime (Worker)	Workers receives job assignments from the Server and runs them.
InTime (Client)	Client submits jobs (FPGA projects) to the Server and collates the results.

5.2 InTime/License Server

The InTime Server acts as a job scheduler/manager and license manager when InTime is running on multiple machines at the same time. A License Server is also packaged together and is a service to allow InTime to use floating licenses. These two services are installed automatically if the default installation options are selected.

Requirements

- Operating System: 64-bit architecture. Windows 10 / Ubuntu 20.04 LTS / Ubuntu 22.04 LTS / Red Hat Enterprise 8 and above, or compatible.

- Minimum 500GB free disk space.
- *Static* IP address (also supports 127.0.0.1) to communicate with InTime worker processes.
- Network ports
 - Ports 39940, 39941 to communicate with InTime worker processes.
 - Port 39942 for the administrative console.
 - Port 39946 for web-based configuration.

 **Note**

Java is required but InTime will install its own Java 1.8.0 JDK.

5.3 Deploy License Server Separately

Note that it is possible to deploy the License Server separately from the InTime Server. This can be due to administrative reasons. For example, licenses are located on an isolated machine. Another reason to separate the License Server is because the InTime handles file transfer and acts as a file handling manager, therefore it might be better to deploy it on a bigger machine.

To understand how to deploy the license separately, please refer to [How to install License Server and InTime Server separately?](#)

5.4 Linux Installation

 **Note**

Starting from InTime version 2023.2, the Linux version of InTime and its companion InTime Server are merged into a single software package for convenience and ease of installation. Depending on your InTime version, follow the "Bundled" or "Standalone" installation steps below.

Bundled InTime Server

1. Once the InTime software is installed, no further step is needed to install InTime Server.
2. The files and directory structure of the `server` folder are the same as those in a standard InTime Server installation. To run InTime Server, create a directory with write access permissions and use the `-wd` argument to point to it.

 **Warning**

Overwriting the files or reinstalling the InTime installer will cause the InTime Server to throw exceptions as files are overwritten. Users need to restart the InTime Server service to resolve the exceptions. The working directory must have sufficient disk space required for the data.

Prerequisite: A folder with write access permissions to serve as InTime Server's working directory.

3. Next, start InTime Server with the `-wd` argument pointing to the newly-created working directory.

In the example below, the user creates a new folder called `intimeserver_wd` to designate as InTime Server's working directory, and copies the InTime license, `server.lic`, into it.

```
$ pwd
/home/user
$ mkdir intimeserver_wd
$ cd intimeserver_wd
$ cp /tmp/server.lic .
$ ./start_server.sh -wd /home/user/intimeserver_wd/

----- SHELL SCRIPT VARIABLES -----
SERVERIP 1          = 192.168.2.100

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269
Write permission (plunify.db) [ OK ]
JDBC (plunify.db)           [ OK ]
JDBC (intimeruns.h2.db)      [ OK ]
Starting InTime Server       [ OK ]
Starting License Server      [ OK ]
Starting ACL Server          [ OK ]
License server.lic           [ OK ]
License has started?         [ OK ]
License not expired?         [ OK ]
License Mac 08:00:27:70:A5:E2 [ OK ]
License features             [ OK ]

Admin portal can be accessed at http://localhost:39946/admin

$
```

Standalone InTime Server

Skip this section if you have already completed the "Bundled InTime Server" installation.

1. Download the InTime Server installer from <https://cloud.plunify.com/downloads>.
2. Login as a privileged user and set user execute permissions for "intimeserver_v<version>_64bit_linux.sh". In this example, the user is "cadadmin", and the installation directory is "/home/cadadmin/intimeserver/".

```
$ pwd
/home/cadadmin/intimeserver/

$ chmod u+x intimeserver_v<version>_64bit_linux.sh
```

Warning

As a security precaution, the "root" user is not allowed to install and run the InTime Server. It is not recommended to install or run any 3rd-party applications as the 'root' user.

3. Run the installer file. Use default options for full installation. For those planning to migrate an existing InTime Server database and configurations from an earlier version, enter the same installation directory to overwrite an current installation.

```
$ ./intimeserver_v<version>_64bit_linux.sh

Verifying archive integrity... 100% All good.
Uncompressing Plunify InTime Server version 2023.1.1 (Build 1234567) 100%

INFO      : Installing to /home/cadadmin/intimeserver

INFO      : Installing 64-bit JDK...

Select installation type: ('1' - Full installation InTime Server/License Server, '2' - License Server only, '3' - InTime Server only) [1]
INFO      : Installing InTime Server/License Server...
INFO      : Completed server type setup.

INFO      : Installing SQLite support (default)...
INFO      : Completed database setup.

Clean up and remove installation files? ('y' - Yes, 'n' - No) [n]
INFO      : Not removing installation files.

Select a JVM (Java Virtual Machine) option:
How to select the JVM option?

Use minimal JVM:
  a. More than 10 Concurrent Runs (parallel compilations).
  b. Project Archive size is 4 GB or more.
  c. InTime Server machine has 4 GB or more RAM.

Use minimal JVM:
  a. More than 6 Concurrent Runs (parallel compilations).
  b. InTime Server machine has less than 4 GB RAM.

Specify JVM option: ('1' - minimal, '2' - optimal) [2]
INFO      : Using optimal JVM configuration by default.
INFO      : Completed JVM setup.

To migrate an existing InTime Server installation, enter the existing installation path: (<Enter> to skip migration)
INFO      : No migration required.
INFO      : Completed migration step.

Specify the license file e.g. server.lic: (<Enter> to skip if you wish to copy the license file manually later)
INFO      : Not automatically installing the license file.
INFO      : Please copy the license file e.g. server.lic to /home/cadadmin/intimeserver/ before running.
INFO      : Completed license file installation step.

InTime Server/License Server installation OK.

Next,
Make sure that the license file (e.g. server.lic) is in /home/cadadmin/intimeserver/
Run the following commands in a terminal console:
  cd /home/cadadmin/intimeserver
  ./start_server.sh
```

```
$
```

Specify JVM (Java Virtual Machine) options

There are two options: [1] Minimal setting for 1GB of heap space - suitable for running just the License Server; [2] Optimal setting for 4GB of heap space - typically used for running the InTime Server.

Install License Server and InTime Server on 2 different servers

To install License Server and InTime Server on 2 or more servers, refer to this webpage for more information.

4. Install license and start the InTime Server. Copy the license file, e.g. *server.lic*, into `/home/cadadmin/intimeserver/` and launch the InTime Server. To launch the InTime Server, run the script `./start_server.sh`.

```
$ pwd
/home/cadadmin/intimeserver
$ ./start_server.sh

----- SHELL SCRIPT VARIABLES -----
PID [OLD]          = 29016
SERVERIP 1         = 192.168.2.100

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-15 02:32:01.269
Write permission (plunify.db) [ OK ]
JDBC (plunify.db)           [ OK ]
JDBC (intimeruns.h2.db)     [ OK ]
Starting InTime Server     [ OK ]
Starting License Server    [ OK ]
Starting ACL Server        [ OK ]
License server.lic         [ OK ]
License has started?       [ OK ]
License not expired?       [ OK ]
License Mac 08:00:27:70:A5:E2 [ OK ]
License features           [ OK ]

Admin portal can be accessed at http://localhost:39946/admin

$
```

```
!!! tip
To start/restart the Server at a later time, just run `./start_server.sh` again. To shut down the server run
`./start_server.sh -stop`
```

5.5 Check InTime Server Status

```
$ ps -ef|grep java
intime 5700 1 2 07:16 pts/3 00:00:03 /home/caadmin/intimeserver/.jdk/bin/java -Xms512m -Xmx1024m -server -
Dlogback.configurationFile=/home/caadmin/intimeserver/.conf/logback.xml -DINTIMESERVER_HOME=/home/caadmin/intimeserver/. -
classpath /home/caadmin/intimeserver/.intimeserver.jar:/home/caadmin/intimeserver/.lib/* com.plunify.main.InTimeServer -directory /
home/caadmin/intimeserver/.plunify_server -licensefile /home/caadmin/intimeserver/.server.lic -log_level info
```

```
!!! tip "Automatically Start Server (Optional)"
To automatically start the InTime Server when a machine boots up, add the following line to `/etc/rc.local`.
$ vi /etc/rc.local
/bin/su -s /bin/bash -c '/home/cadadmin/intimeserver/start_server.sh' cadadmin
```

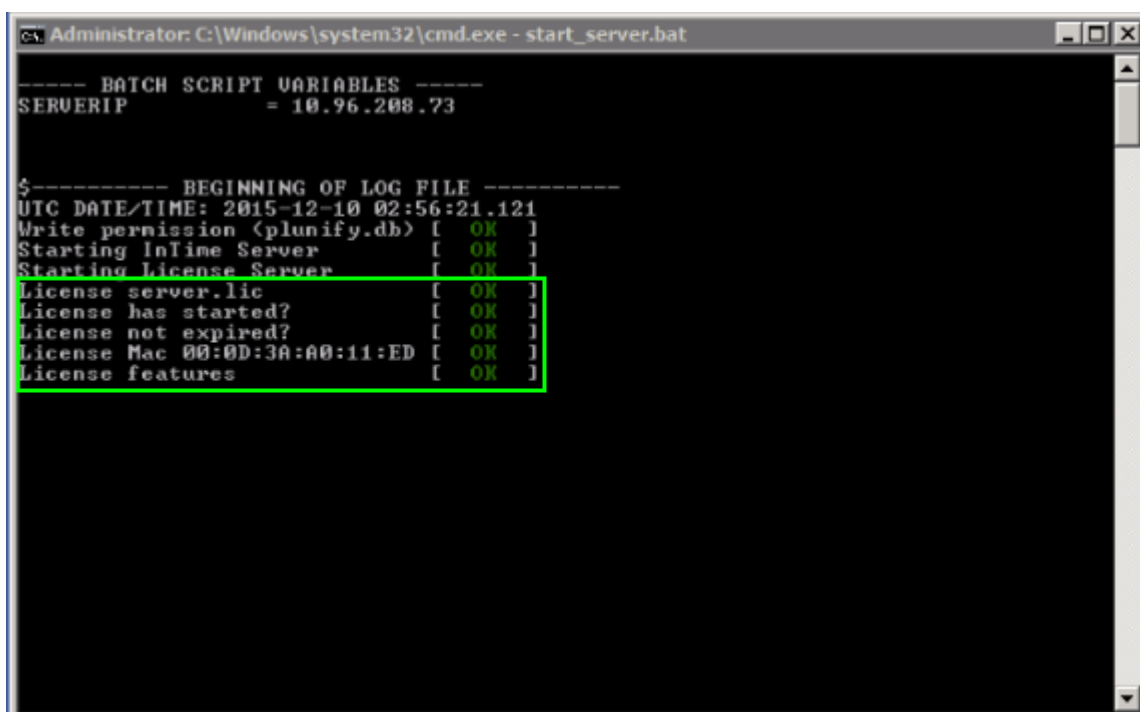
5.6 Windows Installation

1. Download the (windows) installer from <https://cloud.plunify.com/downloads>.
2. Run the installer by double-clicking it on the machine designated as the InTime server. Select "Full Installation" to install the default. InTime Server will be installed in the default directory `C:\intimeserver`. The installer will attempt to overwrite earlier version of libraries and files, do make sure a backup to this directory before installing.
3. Request a license from Plunify by providing the MAC address of the InTime Server machine. After receiving the license file, for example, `server.lic`, place it in `C:\intimeserver`.
4. Open a command prompt and navigate to `C:\intimeserver`. To launch InTime Server, run the `start_server.bat` script.

🔥 Stop and restart

To shut down the server run `start_server.bat -stop`. To start/restart the Server at a later time, just run `start_server.bat` again in another shell.

Please ensure that you see the license acceptance message as shown below

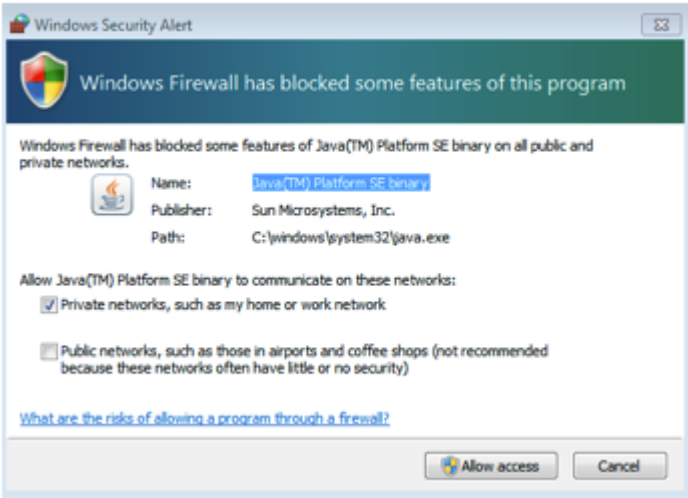


```
Administrator: C:\Windows\system32\cmd.exe - start_server.bat

----- BATCH SCRIPT VARIABLES -----
SERVERIP          = 10.96.208.73

$----- BEGINNING OF LOG FILE -----
UTC DATE/TIME: 2015-12-10 02:56:21.121
Write permission <plunify.db> [ OK ]
Starting InTime Server [ OK ]
Starting License Server [ OK ]
License server.lic [ OK ]
License has started? [ OK ]
License not expired? [ OK ]
License Mac 00:0D:3A:A0:11:ED [ OK ]
License features [ OK ]
```

A Windows Security Alert may pop up indicating that a Java binary is running. Click "Allow access" as shown below



5.7 Unattended Installation

Assuming the InTime version is 2023.2.

Windows: `C:\Users\Test\Downloads> intime_v2023.2.0_64bit_win.exe /AllUsers /S /NCRD`

Linux: `$ ACCEPT_LICENSE=1 DEFAULT_INSTALL=1 sh intime_v2023.2.0_64bit_linux.sh`

Similarly, for InTime Server,

Windows: `C:\Users\Test\Downloads> intimeserver_v2023.2.0_64bit_win.exe /AllUsers /S /NCRD`

Linux: `$ DEFAULT_INSTALL=1 sh intimeserver_v2023.2.0_64bit_linux.sh`

Argument	Description
DEFAULT_INSTALL	'1' - Full installation InTime Server/License Server, '2' - License Server only, '3' - InTime Server only

6. Configure InTime Client

Pre-requisites

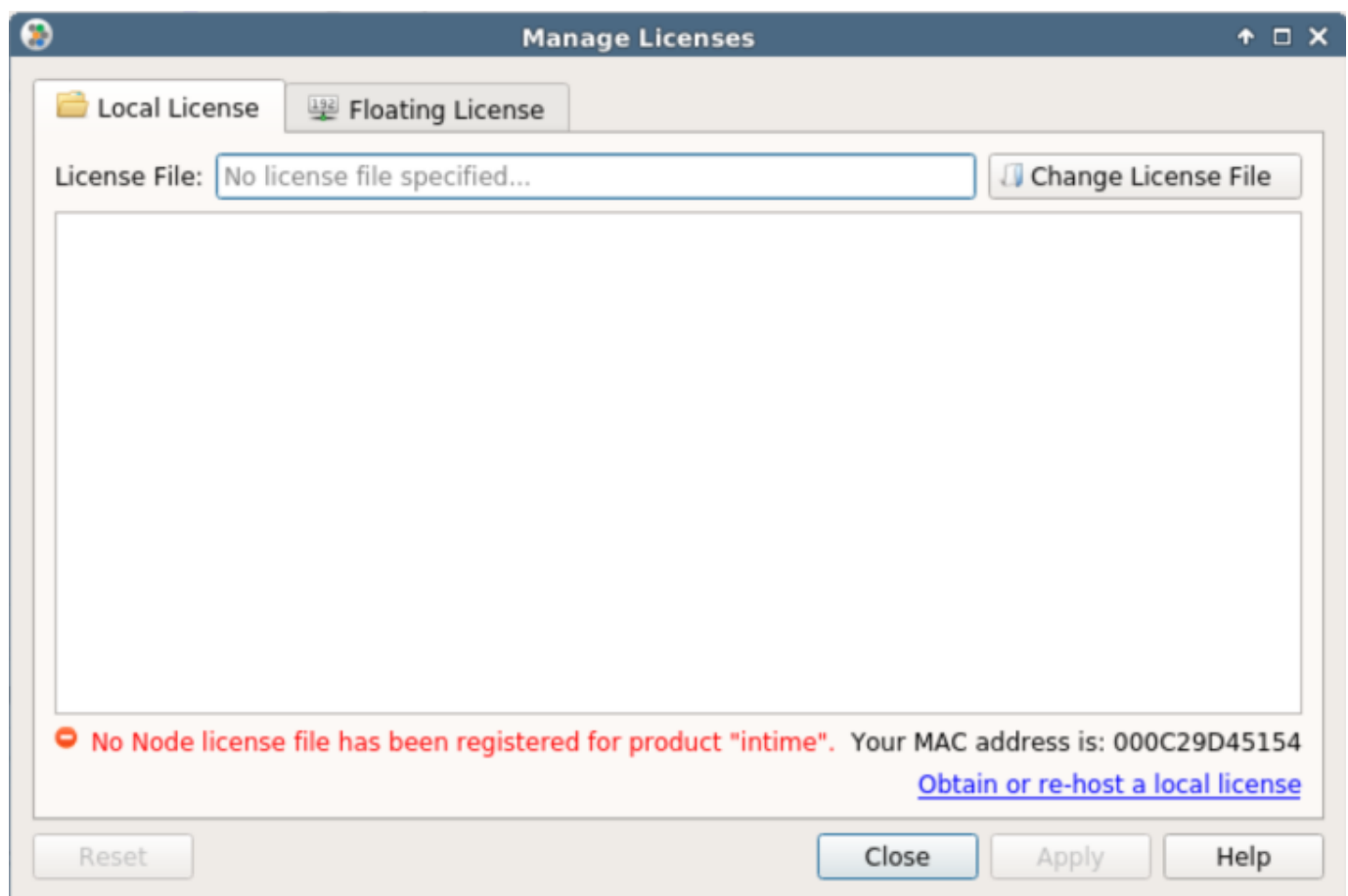
1. InTime is installed on the current machine or a shared network drive.
2. One or more FPGA software installations are used to build the design.

6.1 Step 1: License Registration

A video tutorial showing how to register your local license is also available [here](#).

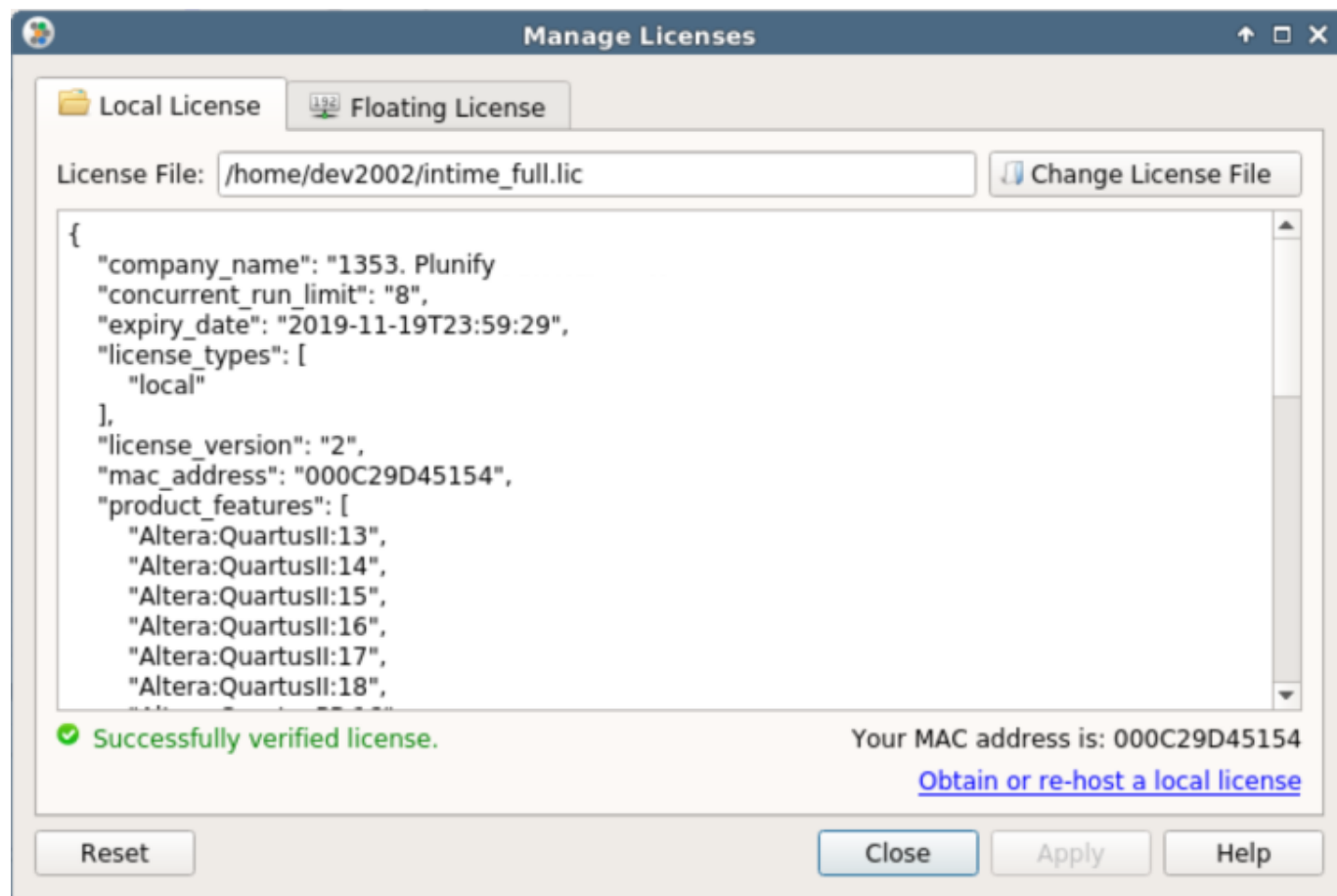
Using InTime GUI

After starting InTime GUI, if you are registering a license for the first time, the manage license widget will indicate that no license is currently registered. The *Manage License* widget can be used to view the state of the registered license at any time.



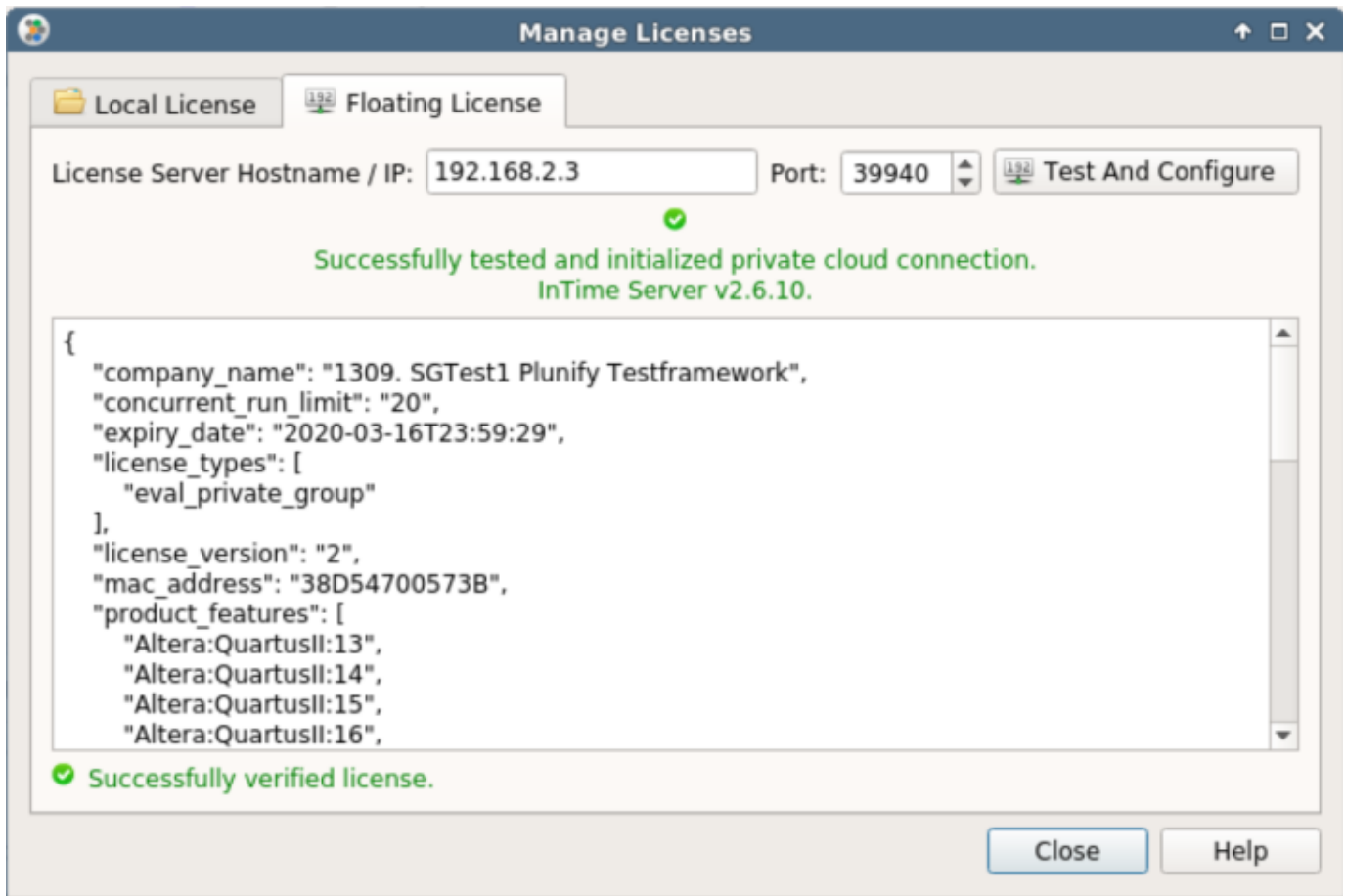
Node License

For a **node-locked** license, click on the "*Change License File*" button and browse to your license file. If the selected license file is valid, it will be loaded and its contents shown and InTime will indicate that the license was successfully verified as shown.



Floating License

For a **floating license**, click on the "*Floating License*" tab, and specify the InTime server or the floating license server's IP address.

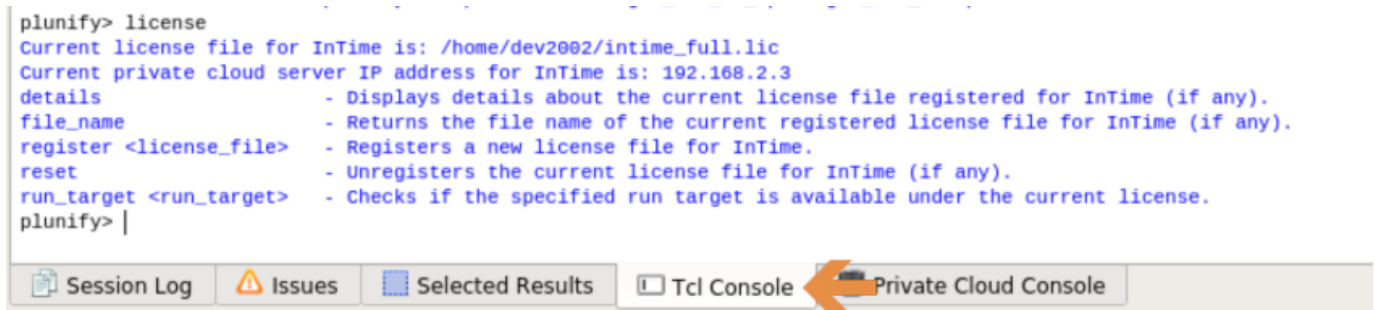


Using InTime Tcl Console or Command Line

The InTime GUI comes with a Tcl console at the bottom of the GUI.

Node License

The `license` Tcl command provides a set of sub-commands which can be used to manage the registered license. To check the current license,



To register a new license file at `"/home/user/license.lic"`, use the following command:

```
plunify> license register /home/user/license.lic
```

You can also save the command to a Tcl file, e.g. `license.tcl` and execute it from the command line.

```
intime_sh -mode batch --platform minimal -s license.tcl
```

Floating License

When starting InTime from the command line, use the `-ip` argument to specify the ip address of the License or InTime Server. Use the `-comport` argument for the port used for the license check.

```
intime_sh -ip 192.168.1.1 -comport 39940 -mode batch -s intimeflow.tcl
```

In this example, InTime is executing a Tcl script in batch mode using a license from the license server at 192.168.1.1

6.2 Step 2: Register FPGA Software

InTime runs on top of FPGA vendor software tools. When opening a project, InTime detects the required FPGA vendor toolchain and initializes it. Therefore, the FPGA vendor tool must be registered before opening any project.

Tip

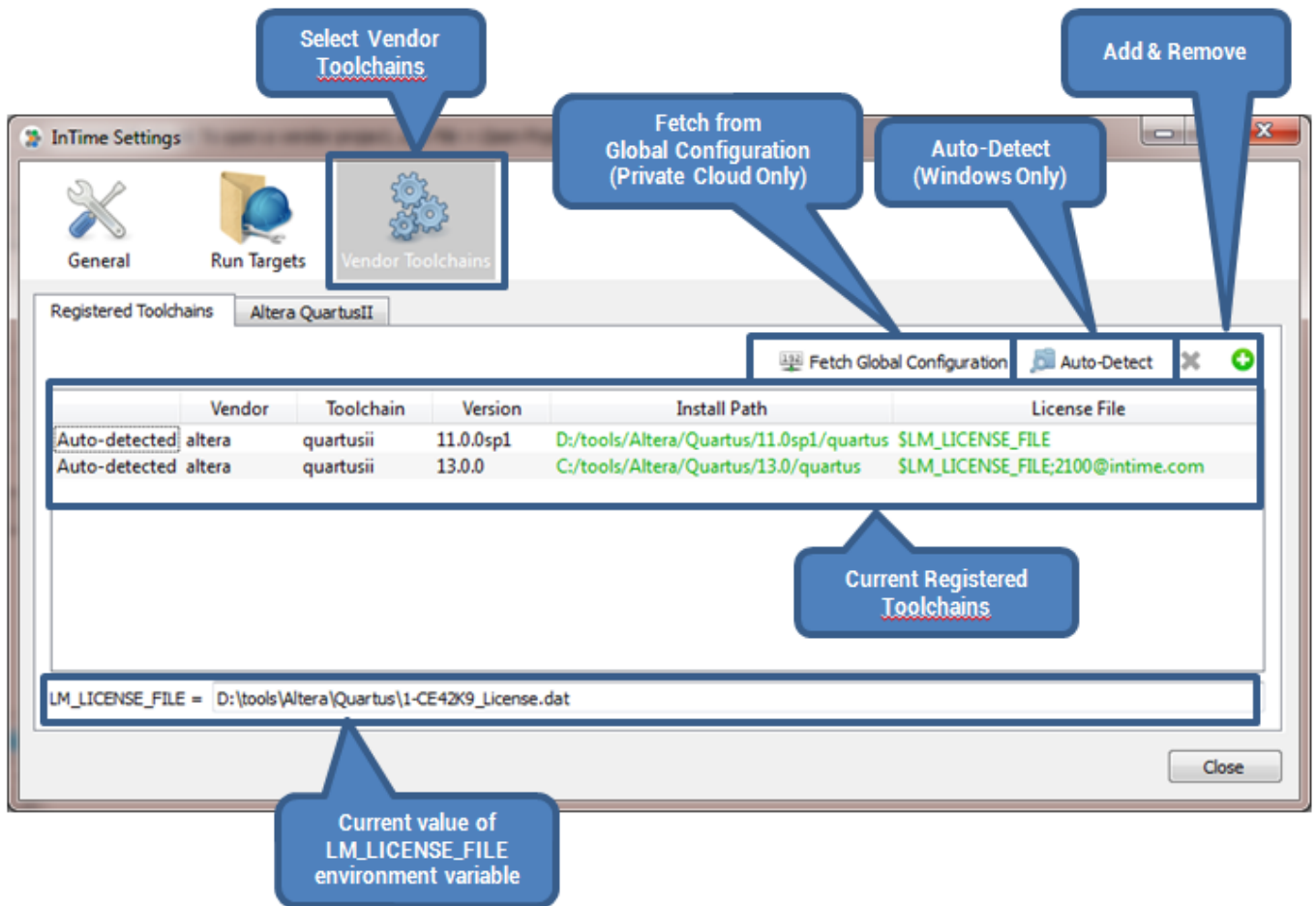
You can skip toolchain configuration if the environmental variables has already been set up. Simply start InTime with the `-tc <toolchain name>`. Example: `intime.sh -tc vivado`. It will pick up the right toolchain automatically. See this kb - Auto-detect FPGA toolchain and license information

For each tool the following information is required:

- **Vendor Name:** The name of the tool vendor.
- **Toolchain Name:** The name of the tool.
- **Install Path:** The path where this version of the tool is installed.
- **License File:** The path where the license or license server associated with this tool can be found. If not specified, InTime uses the `LM_LICENSE_FILE` variable in the environment in which InTime was launched.

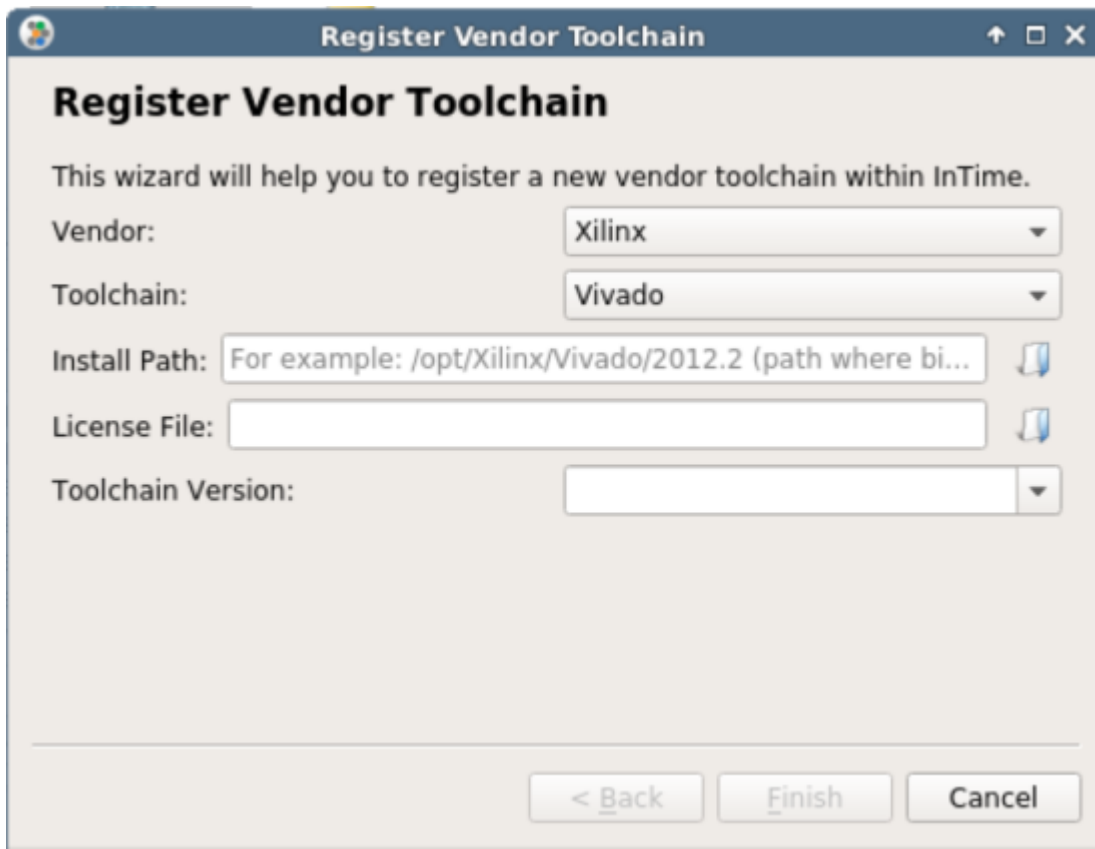
With InTime GUI

To register and manage toolchains (your installed FPGA software), open the *"File" > "Settings"* menu and then select *"Vendor Toolchains"*



New tools can be added either using the auto-detection mechanism (only available on Windows OS) or the *Register Vendor Toolchain* wizard by clicking on the "Add Tool" button.

This wizard gives hints on which path in the tool installation directory needs to be selected and detect the tool version automatically. If the wrong directory in the tool installation tree is selected, an error message will appear.





Register Vendor Toolchain

This wizard will help you to register a new vendor toolchain within InTime.

Vendor:

Toolchain:

Install Path: 

License File: 

Toolchain Version:

With InTime Tcl Console

Vendor toolchain management in the Tcl environment is done using the `vendors` command.

```
# Command to auto-detect toolchains (only available on Windows):
plunify> vendors auto_detect
```

To register new tools, use the following command:

```
# Command to manually register new toolchains:
plunify> vendors register <vendor_name> <toolchain> <install_path> <license_file>
```

To show all registered toolchains

Type `vendors list`. It will give a quick overview of currently registered toolchains.

Using the Command line

To configure InTime via the command line, please download sample configuration scripts from the Plunify github.

- Edit the `intime_install_FPGA_tools.tcl` to specify the installation path to the FPGA toolchains and their respective licenses. Multiple toolchains can be configured at the same time.

```
set yourtoolchainpath(0) "/mnt/Xilinx/Vivado/2018.2"
set yourtoolchainlicense(0) "/mnt/license_file.lic"
#
# If you have multiple toolchains, use an array to specify them
#
# set yourtoolchainpath(1) "/mnt/Xilinx/Vivado/2017.4"
# set yourtoolchainlicense(1) "/mnt/license_file.lic"
# set yourtoolchainpath(2) ""
# set yourtoolchainlicense(2) ""
```

- Open the command-line interface, and run the command

```
./intime.sh -mode batch -platform minimal -s intime_install_FPGA_tools.tcl
```

This should configure InTime to recognize where are the FPGA tools and licenses.

7. InTime Cluster Mode (Linux only)

Note

Starting from InTime version 2023.2, users are encouraged to run InTime in a new `-cluster` mode. "Cluster" mode is InTime's new mechanism for distributing builds that is easier to set up and manage compared to previous methods. Users running InTime on a single server machine can skip this section.

7.1 Prerequisites

Using InTime in cluster mode requires the following:

1. Cluster mode is supported only in Linux, supporting LSF/PBS/SGE/SLURM or conventional SSH.
2. The FPGA vendor tool volume and mount point must be accessible by InTime and all build machines via NFS.
3. The project disk volume and mount point must be the same and accessible by InTime and all build machines via NFS.

Warning

If any of the above conditions is not met, cluster mode will not work.

7.2 Launch InTime in Cluster mode

Pre-requisite: Ensure that the FPGA vendor tool executable is in the PATH environment variable.

Example 1

Launch InTime with Vivado 2023.1 to use SSH in a HPC cluster with host 192.168.1.2, 192.168.1.3.

```
$ export LM_LICENSE_FILE=2100@192.168.2.250
$ source /mnt/opt3/Xilinx/2023.1/Vivado/2023.1/settings64.sh
$ cd <intime installation folder>
$ ./intime.sh -ip 192.168.2.3 -comport 39940 -cluster ssh -tc vivado -clusterargs "192.168.1.2 192.168.1.3"
```

Here is an explanation of the arguments used in the command:

Arguments	Description
ip	This is the InTime Server/License IP address
comport	This is the network port required to connect to the server.
cluster	This is a mandatory argument when using Cluster mode. Options include <code>lsf</code> , <code>pbs</code> , <code>sgc</code> , <code>slurm</code> and <code>ssh</code> .
clusterargs	This is an optional argument when using Cluster mode. Options include <code><queue parameters or hosts list></code> .
tc	FPGA vendor tool type. Options include <code>vivado</code> , <code>quartusii</code> , <code>quartuspp</code> , <code>libero</code> and <code>ise</code> . It will detect the version from the PATH variable.

-cluster (mandatory)

InTime will fall back to "Agent" mode if the `-cluster` argument is not supplied.

Options	Description
lsf	Use in a LSF environment.
pbs	Use in a PBS environment
sge	Use in a SGE environment.
slurm	Use in a SLURM environment.
ssh	Use in an environment where the user can logon to build machines via SSH.

-clusterargs (optional) This is an optional argument because users can setup the parameters after InTime has started.

Options	Description
<code><queue or partition info></code>	Use in a LSF/PBS/SGE/SLURM/SSH environment.

After launching InTime in Cluster mode, go to File > Settings... > Run Targets.

In this example, the user has specified 2 build machines with the IP addresses, 192.168.1.2 and 192.168.1.3, using the `-clusterargs` argument.

InTime Settings

General Run Targets Vendor Tool... Notification

Private Cloud Private Cloud Admin

Note: Changes are not allowed when IP is configured using -ip 192.168.2.3 argument.

Server Hostname / IP: 192.168.2.3 Port: 39940 Test And Configure

☐ Use custom server parameters:

File transfer port: 39941

Admin console port: 39942

File transfer method: SFTP

Server working directory: plunify_server

Grid Parameters (SSH):

Enabled

SSH Type: 1 Key Folder: /home/betauser/.plunify Browse

SSH Port: 22 SCP Path: /usr/bin/scp Browse

SSH Auto Fire: Yes SSH Path: /usr/bin/ssh Browse

SSH User: betauser Use atd: No

Hostname / IP: Test Add

Servers: 192.168.1.2 192.168.1.3 Remove

Start Agent -> Servers

Close

Example 2

Launch InTime with Vivado 2023.1 to use SGE in a HPC cluster with queue dev.q.

```
$ export LM_LICENSE_FILE=2100@192.168.2.250
$ source /mnt/opt3/Xilinx/2023.1/Vivado/2023.1/settings64.sh
$ cd <intime installation folder>
$ ./intime.sh -ip 192.168.2.3 -comport 39940 -cluster sge -tc vivado -clusterargs "-q dev.q"
```

After launching InTime in Cluster mode, go to File > Settings... > Run Targets.

As shown in the image, SGE has been enabled in the Grid Parameters settings.

The screenshot shows the 'InTime Settings' dialog box with the 'Run Targets' tab selected. The 'Grid Parameters (Cluster mode)' section is expanded, displaying the following configuration:

- Client action:** `qsub ${USER_ARGS} -sync n -S /bin/sh -j yes -cwd -V ${REVISION_DIR}/intime_${FILE...`
- Executable:** `qsub`
- User Arguments (\$USER_ARGS):** `dev.q`
- Arguments:** `${USER_ARGS} -sync n -S /bin/sh -j yes -cwd -V ${REVISION_DIR}/intime_${FILE_INDEX}.sh`
- Working directory:** `InTime's working directory`
- Trigger type:** `Concurrent Runs`
- Buttons:** `Test` and `Abort job if unsuccessful.`

The 'InTime Server Parameters' section is also visible, showing:

- Auto-detect server address:** ☐
- File transfer port:** `39941`
- Admin console port:** `39942`

The 'Close' button is located at the bottom right of the dialog box.

8. Compute Grid Automatic Configuration

Note

Users running InTime on a single server machine or via Cluster Mode can skip this section.

This guide assumes that InTime Server and License are installed successfully.

8.1 Quick Start Options

Pre-requisite: Ensure the FPGA tool executable is in the environment PATH variable.

Example 1

Launch InTime Client with InTime Server and License located at the IP address 1.1.1.1, using a port number of 33940, and opening a Vivado project.

```
$ ./intme.sh -ip 1.1.1.1 -comport 33940 -tc vivado
```

Below is an explanation of the arguments used in the command.

Arguments	Description
ip	This is the InTime Server/License IP address
comport	This is the network port required to connect to the server.
tc	FPGA vendor tool type. Options include <code>vivado</code> , <code>quartusii</code> , <code>quartuspp</code> , <code>libero</code> and <code>ise</code> . It will detect the version from the PATH variable.

Example 2

Specify the InTime Server as part of the LM_LICENSE_FILE environment variable, e.g. 39940@1.1.1.1 where 1.1.1.1 is the InTime Server IP. The InTime Client will automatically pick up the required information.

```
$ export LM_LICENSE_FILE=39940@1.1.1.1
$ ./intime.sh -tc vivado
```

Quick Setup - LSF/PBS/SGE/SLURM

After launching InTime, run this command in the Tcl console. For example, for LSF,

```
misc set grid lsf
```

This will automatically setup the arguments necessary to submit jobs into the grid. The details can be verified under the "Settings" menu, then "Run Targets", "Private Cloud" tab.

The screenshot shows the 'InTime Settings' window with the 'Private Cloud' tab selected. The 'Plunify Cloud' sub-tab is also visible. The 'Server Hostname / IP' is set to '192.168.2.221' and the 'Port' is '39940'. A 'Test And Configure' button is present. The 'Grid Parameters' section includes a 'Client action' field with the command 'qsub \${USER_ARGS} -sync n -S /bin/sh \${INTIME_HOME}/in...'. Below this are fields for 'Executable' (qsub), 'User Arguments (\$USER_ARGS)' (Replacement for \${USER_ARGS} macro), 'Arguments' (a multi-line command string), 'Working directory' (InTime's working directory), and 'Trigger type' (Concurrent Runs). There is a 'Test' button and a checkbox for 'Abort job if unsuccessful'. At the bottom, there are instructions and links for clearing SGE parameters, configuring for all users, and enabling the Private Cloud Console.

InTime Settings

General Run Targets Vendor Tool... Notification

Private Cloud Plunify Cloud

Server Hostname / IP: 192.168.2.221 Port: 39940 Test And Configure

Grid Parameters:

Client action: `qsub ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/in...` Details ^

Executable: qsub

User Arguments (\$USER_ARGS): Replacement for \${USER_ARGS} macro

Arguments: `${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -
intime_home /mnt/disk/plunifygit/working-scripts/backend/fpga/heuristics/
intime -mode background -platform minimal -ip ${INTIME_SERVER} -comport $
{INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs $`

Working directory: InTime's working directory

Trigger type: Concurrent Runs

Test ☐ Abort job if unsuccessful.

Click [here](#) to clear SGE parameters for the current user.

- To configure it for all users,
- click [here](#) to use the Private Cloud Admin webpage;
- enable the Private Cloud Console from the View menu and refer to the online Help for [more details](#).

For more information about customizing the grid commands and configuration, please refer to LSF/PBS/SGE/SLURM configuration. Other grids such as SGE and PBS are also supported.

The quick start is meant to enable user to start running quickly, with some pre-requisites. In the event that the quick start does not work, the environments need to be setup manually.

8.2 Configuration Tools

To setup the environment manually, there are a few options to configure the InTime Server and build environment.

1. Admin Web Portal (Browser)
2. Private Cloud Console (InTime GUI)
3. Admin Console (Terminal)

Admin Web Portal

The InTime Server Admin Web Portal allows users to configure InTime Server settings from a web browser, making configuration faster and easier.

PLUNIFY

License

Toolchain

Client Action

Logout

Toolchain Management

No.	OS	Vendor	Toolchain	Path	License file/server	Edit	Delete
1	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2019.2/Vivado/2019.2	2101@192.168.2.250	Edit	Delete
2	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2020.1/Vivado/2020.1	2101@192.168.2.250	Edit	Delete
3	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2018.3/Vivado/2018.3	2101@192.168.2.250	Edit	Delete
4	Linux	Microchip	Libero	/mnt/opt1/Microsemi/Libero_SoC_v12.5_SP1/Libero	2102@192.168.2.250	Edit	Delete
5	Linux	Altera	QuartusII	/mnt/opt1/Altera/18.0.0/quartus	2100@192.168.2.250	Edit	Delete
6	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2020.2.2/Vivado/2020.2.2	2102@192.168.2.250	Edit	Delete
7	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2018.3.1/Vivado/2018.3.1	2101@192.168.2.250	Edit	Delete

[Add Toolchain](#)

Please refer to Admin Web Portal page for more information.

Private Cloud Console

Server Workers Jobs

```

InTime Server version: v3.2.0
Git: v3.2.0 (Build c651564)
Built on 2021-05-28 19:39:07
Type ".help" for instructions. For help on any command, type ".help.<command>"

user> |
          
```

Session Log

Issues

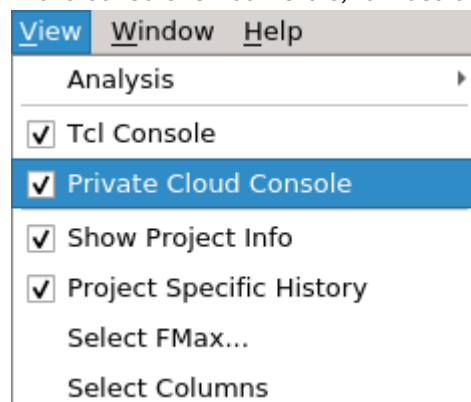
Selected Results

Tcl Console

Private Cloud Console

Type the commands in the console to execute them. You do not require access to InTime Server to execute them.

If the console is not visible, it must be enabled from within the InTime GUI by enabling it as shown below



Admin Console

If you have access to the InTime Server, there is an administration console provided for configuration tasks. The InTime Server only allows localhost for admin access by default. The user has to start InTime Server with an additional argument to make admin mode available to all users. See section on Remote Administration

To launch the Admin Console:

```
$ pwd
/home/intime/intimeserver

$ ./admin_console.sh
InTime Server version: 1.1.0
Git: v1.2.0 (Build cd64f0b)
Type ".help" for instructions. For help on any command, type ".help.<command>"

user>
```

After launching the console, enter Admin mode using the `.admin` command:

```
user>.admin
admin>
```

To leave Admin mode and return to User mode, type `.user`. To exit the Admin Console when in User mode, type `.exit`.

For more information on the commands, refer to the Private Cloud / InTime Server Administration page.

9. Configuration for Multiple Seats

To understand how InTime is deployed for multiple seats, please refer to InTime Installation for Multiple Seats.

There are 2 parts to the configuration.

1. Configure the InTime Client - Specify location of the InTime Server.
2. Configure the build environment - Where the FPGA tools are installed.

9.1 Configure InTime Client

GUI

Specify the Server IP address and communications port ("comport") information in the dialog shown below. Open the settings dialog using *File*, then *Settings*. Under the *Private Cloud* tab enter the Server IP and "comport", then click *Test And Configure* as shown below

The screenshot shows the 'InTime Settings' window with the 'General' tab active. Under the 'Private Cloud' sub-tab, the 'Hostname / IP' is '192.168.2.210' and the 'Port' is '39940'. A green checkmark and message 'Successfully tested and initialized private cloud connection. InTime Server v1.2.3.' are displayed. Below this, the 'Client Parameters' section shows a 'Client ID' of 'g00134793_192_168_2_210'. The 'Server Parameters' section has a checked 'Auto-detect server address' option and fields for 'File transfer port' (39941), 'Admin console port' (39942), and 'File transfer method' (SFTP). A 'Close' button is at the bottom right.

Tip

If your Server was started with multicast enabled, the above fields will be set automatically.

Tcl Script

If you are running the InTime Client in Tcl mode, the following Tcl commands can be used to set the server address.

```
run_target set private_cloud ip <value>
run_target set private_cloud comport <value>
```

Once specified, perform a network connection test:

```
run_target test_connection private_cloud
Successfully received response from InTime Server v1.1.0
```

9.2 Configure Build Environment

To configure all the InTime clients/workers at the same time, InTime uses a setting called "global configuration". All the InTime clients/workers will retrieve this "global configuration" from the InTime Server.

The instructions here applies to either the Admin Console or the Private Cloud Console. To use the Admin Web Portal, please refer to InTime Server Admin Web Portal .

In this example, the FPGA tool is installed at `/mnt/opt/Vivado/2019.1` and the tool license is a floating one located at `2100@192.168.10.2`.

```
admin> .global.set.toolchain

Enter Operating System for tool, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os> 1

Enter tool, use .end to exit session.
Tools: ('1' for QuartusII, '2' for ISE, '3' for Vivado, '4' for QuartusPP)

admin.tool> 1

Enter installation path, use .end to exit session.
For example, /opt/Vivado/2014.2

admin.path> /opt/Vivado/2019.1

Enter license path, use .end to exit session.
For example, /home/user/nodelock.dat or port@hostname for floating license

admin.license> 2100@192.168.10.2

Operating System : Linux
Tool : Vivado
Installation path : /opt/Vivado/2019.1
License : 2100@192.168.10.2

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm> y

Add more toolchain? ('y' for Yes or 'n' for No) [y]

admin.confirm> n
```

To check your what has been configured, just type `global.toolchain`

```
admin> global.toolchain

+-----+-----+-----+-----+-----+-----+
| NO. | OS   | VENDOR | TOOL   | PATH                                     | LICENSE |
+-----+-----+-----+-----+-----+-----+
| 1   | LINUX | Altera | QuartusII | /mnt/opt/Altera/13.1.2/quartus | 2100@192.168.10.2 |
+-----+-----+-----+-----+-----+-----+

```

The InTime Clients and Agents in the network will automatically fetch the toolchain information. Agents will poll and refresh this information at regular intervals. However, if a Client is already running while the Server

configuration was being changed, the user must manually fetch the updated information. Alternatively, restart the Client if possible.

To view the rest of the global configuration commands, use the `.global` command:

```
user>.global
+-----+-----+
| USAGE           | DESCRIPTION |
+-----+-----+
| .global.client_action | show configured client settings for workers |
| .global.setting      | show configured setting for workers |
| .global.toolchain     | show configured toolchains for workers |
+-----+-----+
```



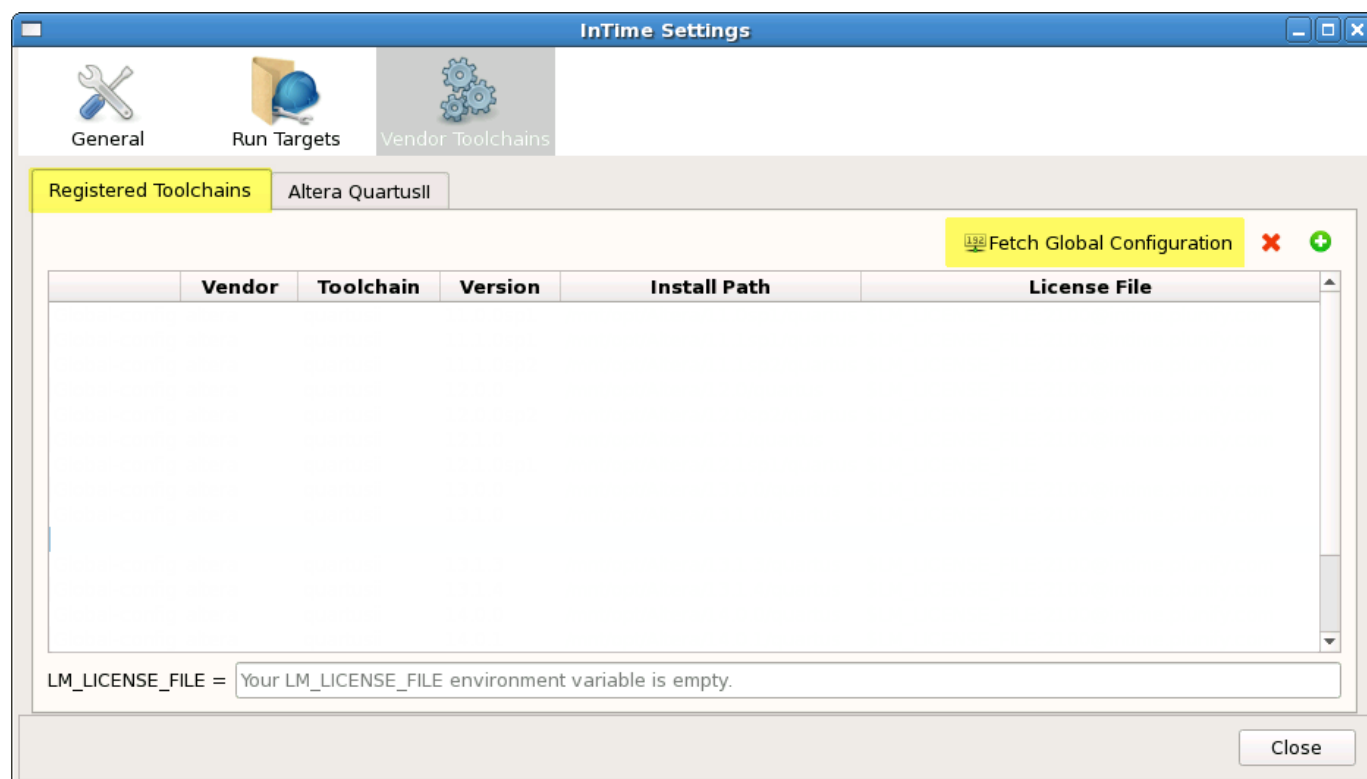
Change Working Directory

Each worker requires a location where the build is first saved and compiled. This is called the "working directory". By default the working directory is located at `<user home>/plunify`. It might be necessary to change this due to disk space limitations on the volume. To change the working directory, use `.global.set.jobdir` in Admin mode.

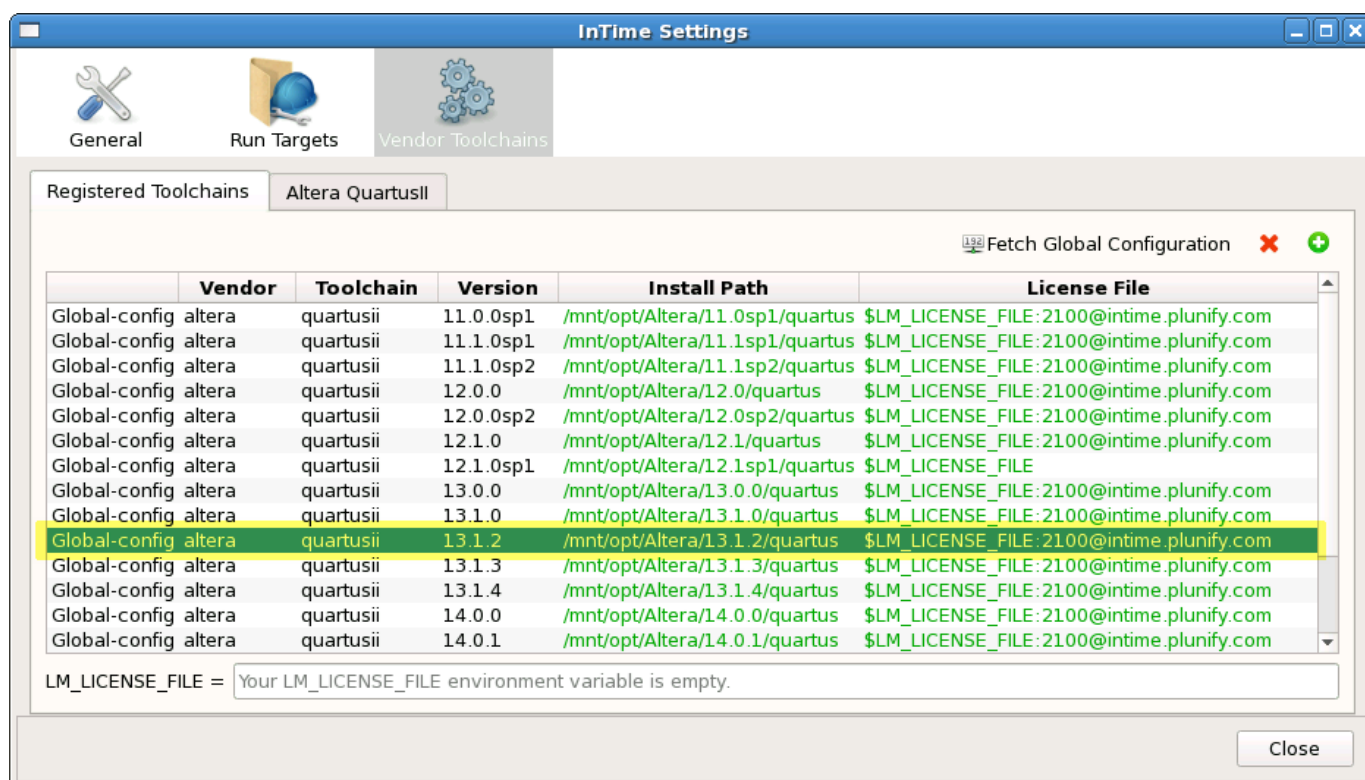
```
user>.admin
admin>.global.set.jobdir=<new working directory path>
```

Verify Configuration

Verify your toolchains in the InTime Client by going to *File -> Settings* and then selecting *Vendor Toolchains*. Click on *Fetch Global Configuration* to see the toolchains configured on your Server.



`Fetch Global Configuration` pulls the information about the FPGA tools that you configured in previous steps. This figure shows many different FPGA tool versions configured in an example setup.



Make sure all the toolchains needed by the Client and build workers are available (Note that they are tagged using the *Global-config* tag in the first column).

When running the InTime Client in commandline mode, the following Tcl command can be used to fetch the toolchain configuration.

```
plunify> vendors fetch_global_config
Successfully fetched and applied global vendor configuration.
```

To view the toolchains which have been fetched, use the following command:

```
plunify> vendors list
To register new environments, use "vendors register <vendor_name><toolchain><install_path>
<license_file>".

Registered Local Tools:
altera
  quartusii
    11.0.0sp1
      Install path: D:/tools/Altera/Quartus/11.0sp1/quartus
      License path: 2100@intime.com
      Category    : Auto-detected
    13.0.0
      Install path: C:/tools/Altera/Quartus/13.0/quartus/
      License path: unconfigured
      Category    : Global-config
```

Tip

It is possible for the user to register additional toolchains which are only installed on specific machines. Note that the other workers will not be able to use those toolchains.

After the build environment is configured, proceed to launch the InTime agents.

10. Launching InTime Agents

10.1 Start Agent

The InTime Agent is responsible for notifying the InTime Server when an InTime worker is online or available. Upon starting the InTime Agent, it will send a notification to the Server that this machine is online. It also informs the InTime Server of its status, such as "Busy", "Pending" etc. The InTime Agent will actively poll the Server. If the agent is uncontactable for an extended period of time, InTime Server will treat this Agent as "inactive" and will not assign any job to it.

There are 3 ways to run the agents

1. Manually logging into remote servers and launch each agent with command line
2. Use SSH to launch agents
3. Launch agents using LSF/PBS/SGE/SLURM workload management/grid systems.

10.2 Using Command Line

The manual way to start an Agent is log onto each build machine and run the `start_agent.sh` script. For example:

```
$ ./intime_agent.sh -ip 192.168.10.1 -comport 39940 -mode background -platform minimal &
```

Below is an explanation of the arguments used in the command.

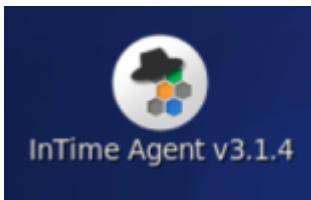
Arguments	Description
ip	This is the InTime Server IP address
comport	This is the network port required to connect to the server.
mode	"background" means it is running as Tcl or a batch
platform	"minimal" means there is no GUI.

The trailing `&` allows `intime_agent.sh` to run in daemon mode, so if you close the terminal, the process will still continue to run.

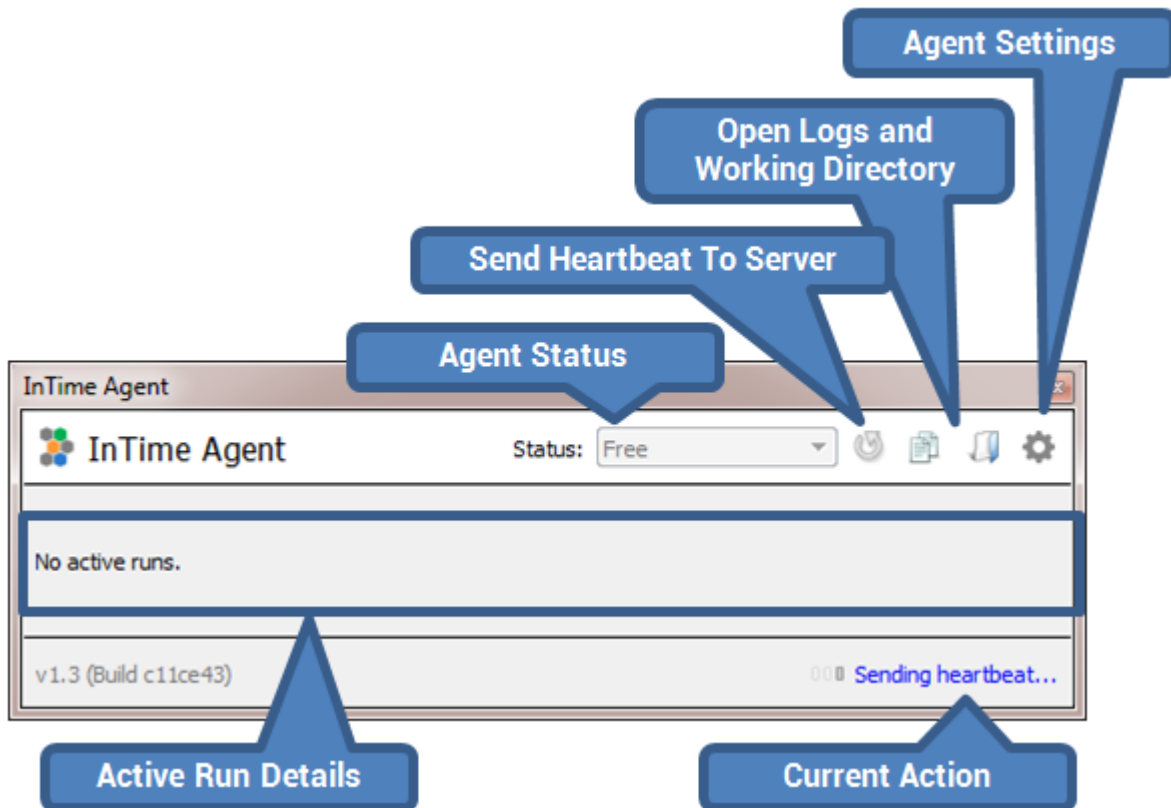
Next, use `.toolchain` to verify if all Agents successfully received and applied the FPGA tools' information from the Server.

```
user>.toolchain
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID | JOBID | USERID | STATUS | ALIVE | VENDOR | TOOL | VERSION |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | user_192_168_2_211 | | user | FREE | YES | ALTERA | QUARTUSII | 13.1.2 |
| 2 | user_192_168_2_212 | | user | FREE | YES | ALTERA | QUARTUSII | 13.1.2 |
+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows (0.01 sec), 2014-12-10 08:48:41
```

Agent GUI Mode



InTime Agent can also be launched in GUI mode. Depending on the operating system, the InTime Agent GUI will also register itself in the system tray (Windows, Ubuntu). After starting the agent, a GUI will appear.



10.3 Using SSH method

InTime version 2.7.0 supports a new feature that starts agents via SSH command. This feature is applicable only in a Linux environment.

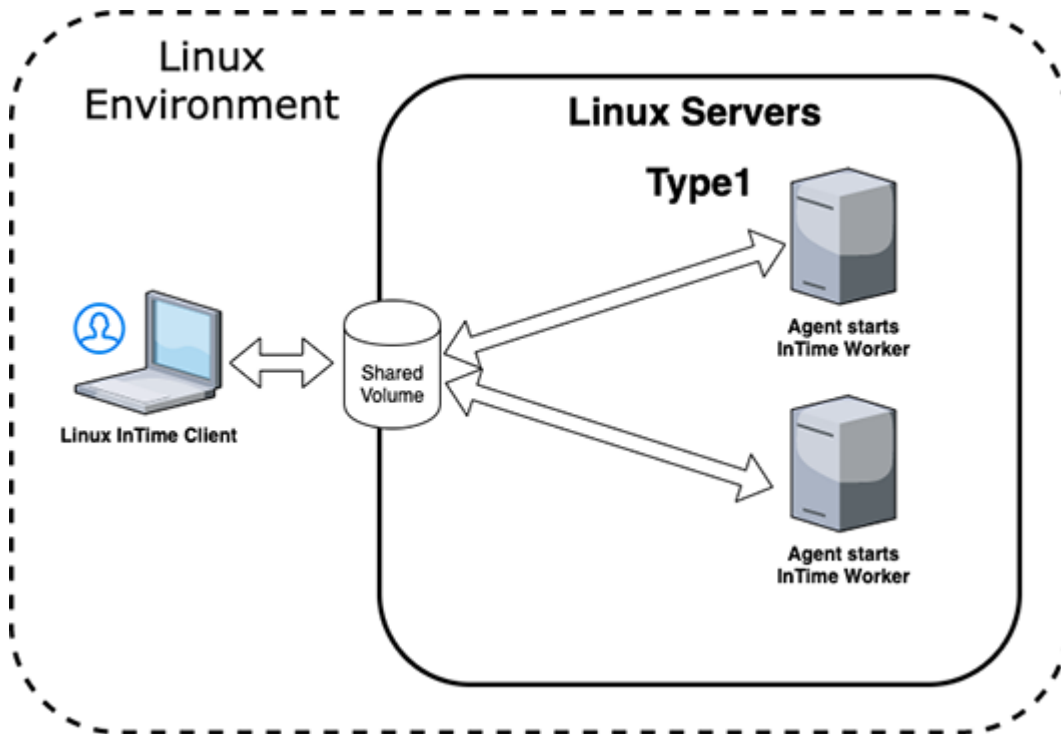
Prerequisites

- The supported environment is Linux, currently InTime does not support Windows.
- The supported SSH protocol is SSH-2.0-OpenSSH.
- The user must have the write permission to the file `~/.ssh/authorized_keys` of all remote servers.
- The InTime tool path must be the same for all Linux machines.

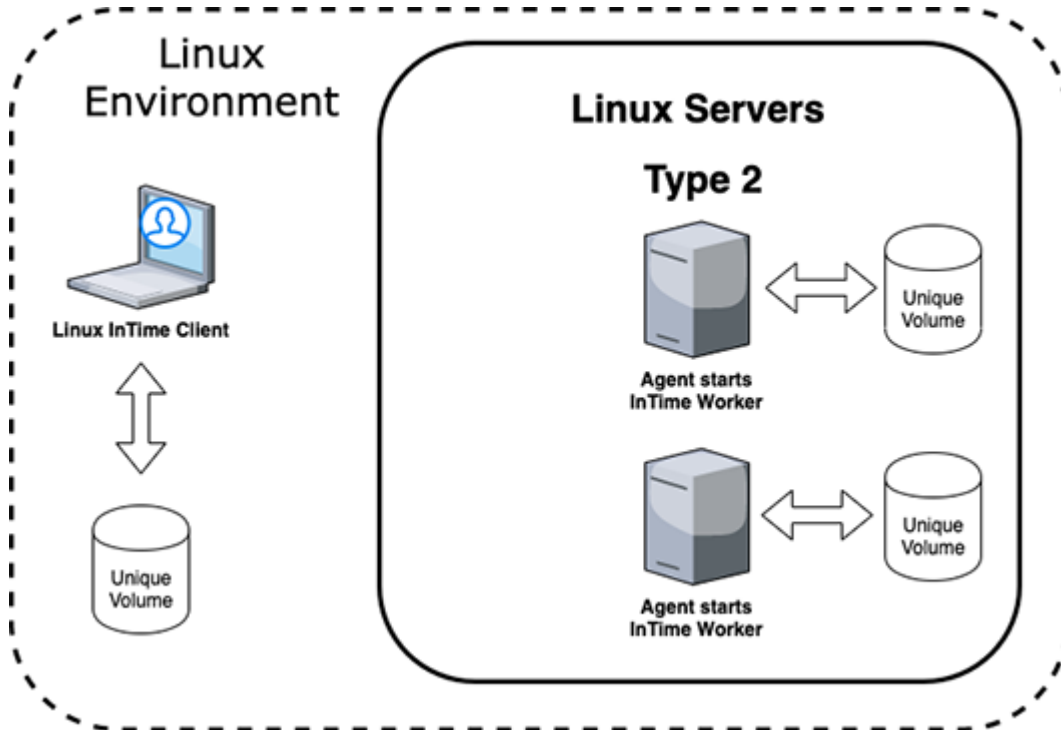
SSH Types

Currently this feature support 2 types of setups.

Type 1 : Users shared a common disk volume to all Linux servers. This is a very common setup.



Type 2 : User does not have a shared disk volume with all servers. Each server has its disk volume and it is not shared. In this case, an additional step is needed to enable SSH access. Open the file `<intime sessions path>/intime.key.pub` (this is the public key), copy and paste the text into the `~/.ssh/authorized_keys` file located in the remote servers that is required to run the agent.



GUI Setup

Open the settings dialog using *File *Settings** and then select *Run Targets*. Check the "Enable" checkbox. Most of the parameters are configured automatically.

SSH Parameters:

☒ Enable

SSH Type: **1** Key Folder: **/home/user/.plunify** Browse

SSH Port: **22** SCP Path: **/usr/bin/scp** Browse

SSH Auto Fire: **Yes** SSH Path: **/usr/bin/ssh** Browse

SSH User: **user** Use atd: **No**

Hostname / IP: **192.168.10.3** Test Add

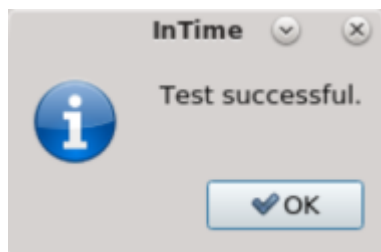
Servers: **192.168.10.2** Remove

Start Agent To Servers

Ensure that the values for the 3 bold parameters are correct.

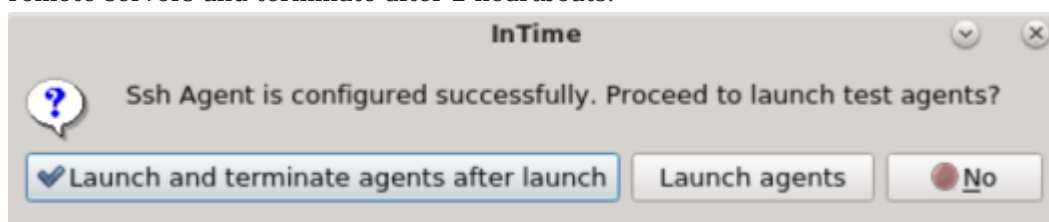
Field Name	Description
SSH Type	The default is type 1 which is the common setup which servers shared a common volume.
SSH Port	The default port is 22. If the SSH port is not 22, change to the correct value. Currently InTime only support same port for all remote servers.
SSH Auto Fire	The default port is Yes. After users submit a job to InTime Server, InTime will attempt to start agents via SSH command. InTime will not start agents when it is set to No.
SSH User	Default to the user that starts InTime.
Hostname / IP	Input the remote servers that will be used for running agents.
Servers	The list of added hostnames, IP addresses.
Key Folder	Default to ~/.plunify. There will be 2 keys generated by InTime. Private key is intime.key and public key is intime.key.pub. The public key will be appended to ~/.ssh/authorized_keys to allow InTime to perform SSH operation.
SCP Path	Default to /usr/bin/scp. This is the location of the scp binary.
SSH Path	Default to /usr/bin/ssh. This is the location of the ssh binary.
Use atd	This is for advanced user. There are cases when InTime needs to leverage on atd daemon to start the agent due to some restriction in SSH command.

1. Enter a valid hostname or IP address in the textbox "Hostname / IP".
2. Click on the "Test" button. If the host allow SSH-2.0-OpenSSH connection, a "Test successful" message box will be shown. If the SSH port, protocol or the IP address entered is not correct, "Test failed!" message box will be shown.



3. Click the "Add" button to add the validated IP address to the Listbox. Repeat the process to add more IP addresses or hostnames.

4. Click on "Start Agent > Servers" button. InTime will attempt to start agent via SSH command with the list of servers for testing purposes.
5. To test the agents, select "Launch and terminate agents after launch" button. This will start agents on the remote servers and terminate after 2 heartbeats.



10.4 Using LSF/PBS/SGE/SLURM

Please refer to the InTime Configuration for LSF/PBS/SGE/SLURM page.

10.5 Verify Agent Status

In the Server Admin Console, type `.status` to list active Agents.

```
user>.status
+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID | JOBID | USERID | STATUS | ALIVE | B.LIST | LAST_HEARTBEAT |
+-----+-----+-----+-----+-----+-----+-----+
| 1 | user_192_168_2_211 | 2915 | user | BUSY | YES | NO | 08:43 (00m:48s) |
| 2 | user_192_168_2_211 | 2915 | user | BUSY | YES | NO | 08:43 (00m:36s) |
+-----+-----+-----+-----+-----+-----+-----+
2 rows (0.01 sec), 2014-12-10 08:44:14
```

Next, use `.toolchain` to verify if all Agents successfully received and applied the FPGA tools' information from the Server.

```
user>.toolchain
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID | JOBID | USERID | STATUS | ALIVE | VENDOR | TOOL | VERSION |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | user_192_168_2_211 | | user | FREE | YES | ALTERA | QUARTUSII | 13.1.2 |
| 2 | user_192_168_2_212 | | user | FREE | YES | ALTERA | QUARTUSII | 13.1.2 |
+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows (0.01 sec), 2014-12-10 08:48:41
```

Agents can be terminated using the `.intime.set.terminate` Admin Console command. See the Private Cloud Console documentation for more information.

Finally, submit a test job using the InTime example design to verify that everything was set up correctly. Jump to the QuickStart page to learn how to submit an example design.

Why are there 2 Job IDs?

When submitting a job for Private Cloud, two Job IDs are created and used. A `Local Job ID` is generated by the InTime Client on the machine from which the builds are submitted. During submission the Server assigns a `Remote Job ID` which is unique within the Private Cloud. The Client shows both IDs in the project's job history, making it easy to track down a job using either ID.

10.6 Terminate Agents

Agents can be terminated using the `.intime.set.terminate` Admin Console command. See the Private Cloud Console documentation for more information.

10.7 Command Line Arguments

Please refer to [InTime Agent Arguments](#) page.

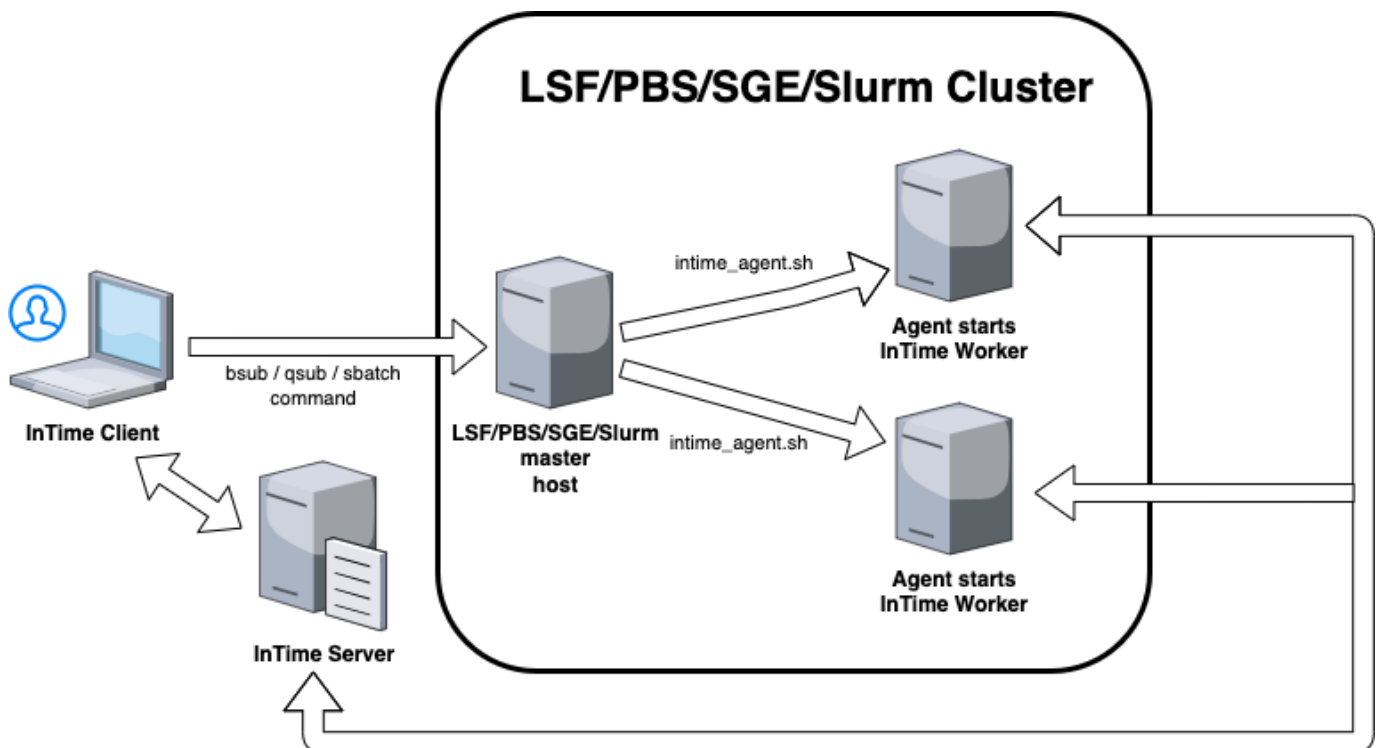
11. InTime Configuration for LSF/PBS/SGE/SLURM

InTime supports 4 types of grid or workload management platforms - LSF, PBS, SGE and SLURM. This section explains how to start an InTime Agent on these platforms.

Important

Before you proceed with this section, please ensure that you have completed the configuration of the build environment, working directory as specified here -configure build environment.

Below is an overview of how InTime, InTime Server interacts with these platforms.



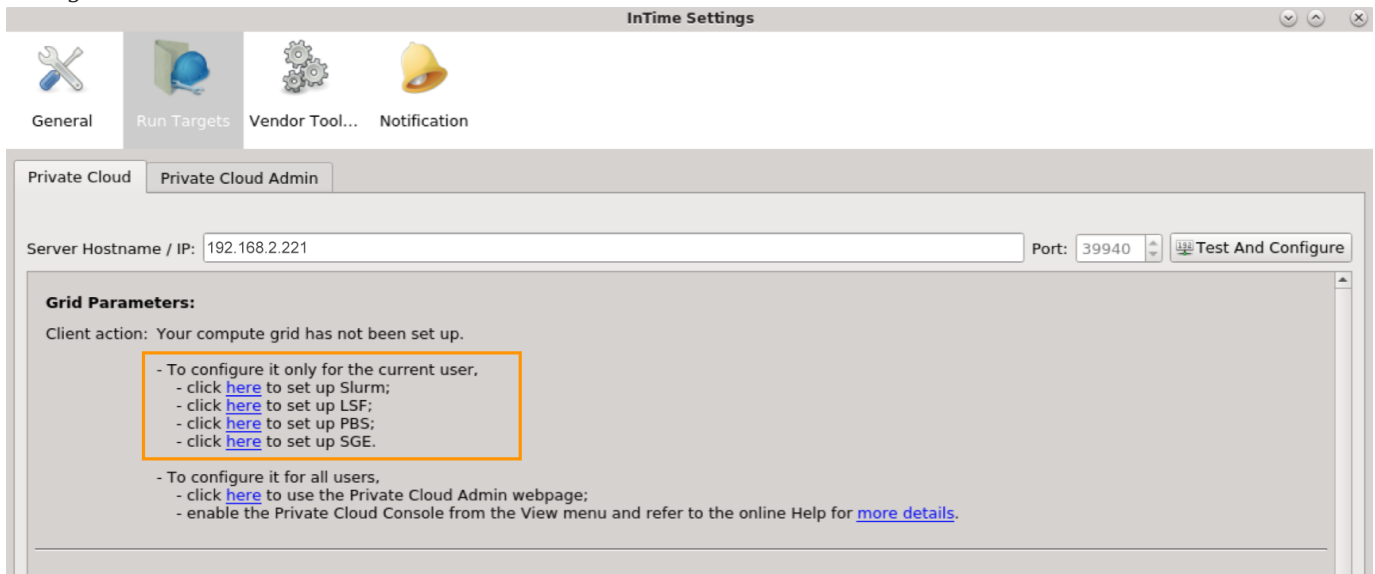
11.1 LSF/PBS/SGE/SLURM Configuration

Quick Setup

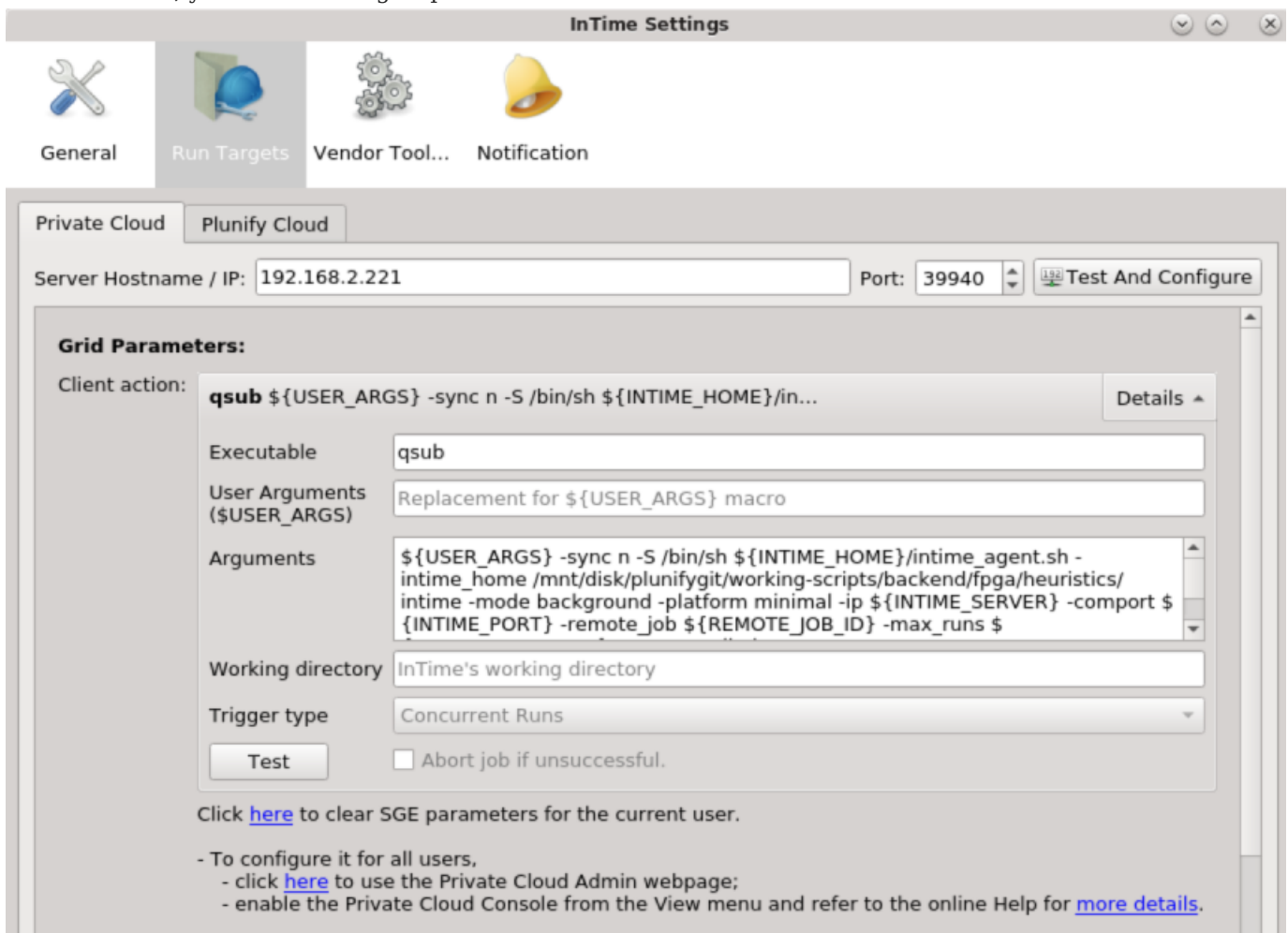
Before you start, try the quick setup command below if you have not tried it previously. Example, for LSF, run

```
misc set grid lsf
```

Alternatively, in InTime, go to "Settings", "Run Targets" then the "Tools" tab. Click on the type of grid configuration to enable it.



After selection, you can see the grid parameters as shown.



Grid Submission Commands

The instructions below applies to either the Admin Console or the Private Cloud Console. To use the Admin Web Portal, please refer to InTime Server Admin Web Portal .

InTime supports 3 grid platforms, the respective job submission commands are:

1. LSF, which uses `bsub` .
2. PBS, which also uses `qsub` but with different arguments.
3. SGE, which uses `qsub` .
4. SLURM, which uses `sbatch` .

For LSF:- (all on the same line) :

```
bsub ${USER_ARGS} ${INTIME_HOME}/intime_agent.sh -mode background -platform minimal -ip ${INTIME_SERVER} -comport ${INTIME_PORT} -
remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit
```

For PBS:- (all on the same line, no space after commas) :

```
qsub ${INTIME_HOME}/intime_agent.pbs -v INTIME_HOME=${INTIME_HOME},IP=${INTIME_SERVER},COMPORT=${INTIME_PORT},REMOTE_JOB=$
{REMOTE_JOB_ID},MAX_RUNS=${AGENT_MAX_RUNS}
```

For SGE:- (all on the same line) :

```
qsub ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -intime_home ${INTIME_HOME} -mode background -platform minimal -
ip ${INTIME_SERVER} -comport ${INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit
```

For SLURM:- (all on the same line, no space after commas) :

```
sbatch ${USER_ARGS} --export=ALL,PL_SLURM_INTIME_HOME=${INTIME_HOME},PL_SLURM_IP=${INTIME_SERVER},PL_SLURM_COMPORT=$
{INTIME_PORT},PL_SLURM_REMOTE_JOB=${REMOTE_JOB_ID},PL_SLURM_MAX_RUNS=${AGENT_MAX_RUNS}
```

Each of these commands submits a request to start an InTime Agent in the LSF / PBS / SGE / SLURM queue/ partition. Once the request is serviced, an Agent will start on the respective machine and the InTime Server will be able to assign builds to it.

Environment variables like `USER_ARGS`, `INTIME_HOME`, `INTIME_SERVER`, etc. are referenced in the following examples. Some of them are specified automatically and you *only* need to configure `USER_ARGS` . You may have to specify additional arguments that are specific to your environment. Please discuss with your IT administrator if necessary.

This is an explanation of the arguments used in the command.

1. `bsub` or `qsub` arguments specific to your environment *must* be inserted before the `intime_agent.sh` command, using the `${USER_ARGS}` environment variable.
2. For PBS, it uses a supplied script called `intime_agent.pbs` to start jobs. The arguments used are similar to LSF and SGE except that you do not need to specify `${USER_ARGS}`.
3. For SLURM, it uses a supplied script called `intime_agent.slurm` to start jobs.
4. Each command contains macros in the form of `${<MACRO_NAME>}` which is resolved by InTime before executing the command. The following macros are available:

Macro Name	Description
INTIME_SERVER	The InTime Server IP/hostname.
INTIME_PORT	The InTime Server communication port.
REMOTE_JOB_ID	The remote job ID of the current job.
LOCAL_JOB_ID	The local job ID of the current job.
JOB_DIR	The local working directory of the current job.
USER_HOME	The user's home path on the InTime Client machine.
INTIME_HOME	The InTime installation directory.
PROJECT_DIR	The current project's directory.
PROJECT_NAME	The current project's name.
USER_ARGS	Any user specific arguments (queue names, priorities etc.)
AGENT_MAX_RUNS	Max runs for agent when action's trigger is "Concurrent Runs".
REVISION_NAME	The revision name when action's trigger is "Revision".

In addition, there are additional arguments for the InTime Agent which gives you more control over its behavior; Specifically:

1. **-no_agent_limit** : Allows multiple Agents run on the same machine. By default only one Agent is allowed to run on a single machine.
2. **-max_runs** : Limits this Agent to the specified number of runs. When the runs are done, the Agent will terminate itself.
3. **-remote_job** : Restricts this Agent to service a particular build job. The InTime Server will only assign jobs which have the specified ID to this Agent.

In the example above, the spawned Agent will only service the specified build job and will automatically terminate as soon as the required number of builds have completed.

11.2 Configure Agents for LSF

Open an InTime Server Admin Console and run the `.lsf.init` command to initialize LSF parameters. You will only need to do this one time for a LSF setup.

Auto-setup

This will configure the agents with the typical LSF settings. If this doesn't work, please refer to "Manual Setup" below.

```
user> .admin
admin> .lsf.init

Auto setup agents for LSF? ('y' for Yes or 'n' for No) [n]

admin.confirm> y
```

Manual Setup

If the auto setup does not work, please configure the agents by answering the questions below.

```
user> .admin
admin> .global.set.client_action

Enter action type, use .end to exit session.
Types: ('1' for Job Initialization) [1]

admin.type> 1

Enter Operating System, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os> 1

Enter script to execute, use .end to exit session.

admin.exec> bsub

(Optional) Enter script arguments, use .end to exit session.

admin.args> ${USER_ARGS} ${INTIME_HOME}/intime_agent.sh -mode background -platform minimal -ip ${INTIME_SERVER} -comport $
{INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit

Enter trigger based on the type, use .end to exit session.
Triggers: ('1' for Single, '2' for Revision, '3' for Concurrent Runs) [3]

admin.trigger> 3

(Optional) Enter working directory, use .end to exit session.

admin.directory>

Enter option to abort a job if it fails, use .end to exit session.
Abort job if fail: ('1' for yes, '2' for no) [1]

admin.option> 1

Enter a number for the order in which the script will be executed, 0 first to be executed, use
.end to exit session. [4]

admin.order> 0

Action Type      : init
Operating System : linux
Execute         : bsub
Arguments       : ${USER_ARGS} ${INTIME_HOME}/intime_agent.sh -mode background -platform minimal -ip ${INTIME_SERVER} -comport $
{INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit
Trigger type    : con_runs
Working Directory :
Abort job if fail : 1
Order          : 0

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm> y

Add more client settings? ('y' for Yes or 'n' for No) [y]
```

```
admin.confirm> n
admin>
```

11.3 Configure Agents for PBS

Open the Server Admin Console and run the `.global.set.client_action` command. The command `.pbs.init` is not supported. The example below shows how to specify your `qsub` command.

```
user>.admin
admin>.global.set.client_action

Enter action type, use .end to exit session.
Types: ('1' for Job Initialization) [1]

admin.type>1

Enter Operating System, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os>1

Enter script to execute, use .end to exit session.

admin.exec>qsub

(Optional) Enter script arguments, use .end to exit session.

admin.args>${INTIME_HOME}/intime_agent.pbs -v INTIME_HOME=${INTIME_HOME}, IP=${INTIME_SERVER},COMPORT=${INTIME_PORT},REMOTE_JOB=${REMOTE_JOB_ID}, MAX_RUNS=${AGENT_MAX_RUNS}

Enter trigger based on the type, use .end to exit session.
Triggers: ('1' for Single, '2' for Revision, '3' for Concurrent Runs) [3]

admin.trigger>3

(Optional) Enter working directory, use .end to exit session.

admin.directory>

Enter option to abort a job if it fails, use .end to exit session.
Abort job if fail: ('1' for yes, '2' for no) [1]

admin.option>1

Enter a number where script will be executed, 0 first to be executed, use
.end to exit session. [4]

admin.order>0

Action Type      : init
Operating System : linux
Execute         : qsub
Arguments       : ${INTIME_HOME}/intime_agent.pbs -v INTIME_HOME=${INTIME_HOME}, IP=${INTIME_SERVER},COMPORT=${INTIME_PORT},REMOTE_JOB=${REMOTE_JOB_ID},MAX_RUNS=${AGENT_MAX_RUNS}
Trigger type    : con_runs
Working Directory :
Abort job if fail : 1
Order          : 0

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm>y

Add more client settings? ('y' for Yes or 'n' for No) [y]

admin.confirm>n
admin>
```

11.4 Configure Agents for SGE

Open a Server Admin Console and run the `.global.set.client_action` command. The command `.sge.init` is not supported. The example below shows how to specify your `qsub` command.

Warning

Do *not* use the `-terse` argument, and note that InTime looks for the return string, "Your job X ("intime_agent.sh") has been submitted" in order to verify successful job submission. With the `-sync n` argument, `qsub` exits with exit code 0 as soon as the job is submitted successfully. In the example below, InTime is installed at `/opt/tools/intime`.

```
user>.admin
admin>.global.set.client_action

Enter action type, use .end to exit session.
Types: ('1' for Job Initialization) [1]

admin.type>1

Enter Operating System, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os>1

Enter script to execute, use .end to exit session.

admin.exec>qsub

(Optional) Enter script arguments, use .end to exit session.

admin.args>${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -intime_home /your/intime_home -mode background -platform
minimal -ip ${INTIME_SERVER} -comport ${INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit

Enter trigger based on the type, use .end to exit session.
Triggers: ('1' for Single, '2' for Revision, '3' for Concurrent Runs) [3]

admin.trigger>3

(Optional) Enter working directory, use .end to exit session.

admin.directory>

Enter option to abort a job if it fails, use .end to exit session.
Abort job if fail: ('1' for yes, '2' for no) [1]

admin.option>1

Enter a number for the order in which the script will be executed, 0 first to be executed, use
.end to exit session. [4]

admin.order>0

Action Type      : init
Operating System : linux
Execute         : qsub
Arguments       : ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -intime_home /opt/tools/intime
                 -mode background -platform minimal -ip ${INTIME_SERVER} -comport ${INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs $
                 {AGENT_MAX_RUNS} -no_agent_limit
Trigger type    : con_runs
Working Directory :
Abort job if fail : 1
Order          : 0

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm>y

Add more client settings? ('y' for Yes or 'n' for No) [y]

admin.confirm>n
admin>
```

11.5 Configure Agents for SLURM

Open the Server Admin Console and run the `.global.set.client_action` command. The command `.slurm.init` is not supported. The example below shows how to specify your `qsub` command.

```
user>.admin
admin>.global.set.client_action

Enter action type, use .end to exit session.
Types: ('1' for Job Initialization) [1]

admin.type>1

Enter Operating System, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os>1

Enter script to execute, use .end to exit session.

admin.exec>sbatch

(Optional) Enter script arguments, use .end to exit session.

admin.args>${USER_ARGS} --export=ALL,PL_SLURM_INTIME_HOME=${INTIME_HOME},PL_SLURM_IP=${INTIME_SERVER},PL_SLURM_COMPORT=${INTIME_PORT},PL_SLURM_REMOTE_JOB=${REMOTE_JOB_ID},PL_SLURM_MAX_RUNS=${AGENT_MAX_RUNS}

Enter trigger based on the type, use .end to exit session.
Triggers: ('1' for Single, '2' for Revision, '3' for Concurrent Runs) [3]

admin.trigger>3

(Optional) Enter working directory, use .end to exit session.

admin.directory>

Enter option to abort a job if it fails, use .end to exit session.
Abort job if fail: ('1' for yes, '2' for no) [1]

admin.option>1

Enter a number where script will be executed, 0 first to be executed, use
.end to exit session. [4]

admin.order>0

Action Type      : init
Operating System : linux
Execute         : sbatch
Arguments        : ${USER_ARGS} --export=ALL,PL_SLURM_INTIME_HOME=${INTIME_HOME},PL_SLURM_IP=${INTIME_SERVER},PL_SLURM_COMPORT=${INTIME_PORT},PL_SLURM_REMOTE_JOB=${REMOTE_JOB_ID},PL_SLURM_MAX_RUNS=${AGENT_MAX_RUNS}
Trigger type     : con_runs
Working Directory :
Abort job if fail : 1
Order           : 0

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm>y

Add more client settings? ('y' for Yes or 'n' for No) [y]

admin.confirm>n
admin>
```

11.6 Verify Agent Status

Use the `.global.client_action` command in the Server Admin Console to check the status of the commands executed.

In the Server Admin Console, type `.status` to list active Agents.

```
user>.status
+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID          | JOBID | USERID | STATUS | ALIVE | B.LIST | LAST_HEARTBEAT |
+-----+-----+-----+-----+-----+-----+-----+
| 1   | user_192_168_2_211 | 2915  | user   | BUSY   | YES   | NO     | 08:43 (00m:48s) |
| 2   | user_192_168_2_211 | 2915  | user   | BUSY   | YES   | NO     | 08:43 (00m:36s) |
+-----+-----+-----+-----+-----+-----+-----+
2 rows (0.01 sec), 2014-12-10 08:44:14
```

Next, use `.toolchain` to verify if all Agents successfully received and applied the FPGA tools' information from the Server.

```
user>.toolchain
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID          | JOBID | USERID | STATUS | ALIVE | VENDOR | TOOL          | VERSION |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1   | user_192_168_2_211 |       | user   | FREE   | YES   | ALTERA | QUARTUSII    | 13.1.2  |
| 2   | user_192_168_2_212 |       | user   | FREE   | YES   | ALTERA | QUARTUSII    | 13.1.2  |
+-----+-----+-----+-----+-----+-----+-----+-----+
2 rows (0.01 sec), 2014-12-10 08:48:41
```

Agents can be terminated using the `.intime.set.terminate` Admin Console command. See the Private Cloud Console documentation for more information.

Verifying Grid Parameters on the Client

Now that you have configured grid parameters, use the InTime Client to test your configuration.

Open the settings dialog using *File, Settings* and then selecting *Run Targets*. Under the *Private Cloud* tab, ensure the InTime Server IP and network ports are filled in, then click on *Test And Configure*.

The client actions configured in the Server will be listed, as shown in

The screenshot shows the 'InTime Settings' window with the 'Run Targets' tab selected. The 'Private Cloud' and 'Plunify Cloud' tabs are visible at the top. The 'Server Hostname / IP' is set to '192.168.2.221' and the 'Port' is '39940'. A 'Test And Configure' button is present. The 'Grid Parameters' section shows a 'Client action' with the command: `qsub ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/in...`. Below this, the 'Executable' is 'qsub', 'User Arguments (\$USER_ARGS)' is 'Replacement for \${USER_ARGS} macro', and 'Arguments' is a complex command string. The 'Working directory' is 'InTime's working directory' and the 'Trigger type' is 'Concurrent Runs'. There is a 'Test' button and a checkbox for 'Abort job if unsuccessful'. At the bottom, there are instructions on how to clear SGE parameters and configure for all users.

InTime Settings

General Run Targets Vendor Tool... Notification

Private Cloud Plunify Cloud

Server Hostname / IP: 192.168.2.221 Port: 39940 Test And Configure

Grid Parameters:

Client action: `qsub ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/in...` Details ▲

Executable: qsub

User Arguments (\$USER_ARGS): Replacement for \${USER_ARGS} macro

Arguments: `${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -
intime_home /mnt/disk/plunifygit/working-scripts/backend/fpga/heuristics/
intime -mode background -platform minimal -ip ${INTIME_SERVER} -comport $
{INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs $`

Working directory: InTime's working directory

Trigger type: Concurrent Runs

Test ☐ Abort job if unsuccessful.

Click [here](#) to clear SGE parameters for the current user.

- To configure it for all users,
 - click [here](#) to use the Private Cloud Admin webpage;
 - enable the Private Cloud Console from the View menu and refer to the online Help for [more details](#).

11.7 Submit a Test Job

Go to the quick start to start a job.

12. Using an Web Interface to Configure InTime Server

The InTime Server Admin Web Portal allows users to configure InTime Server settings from a web browser, making configuration faster and easier. In this section we look at the various options available.

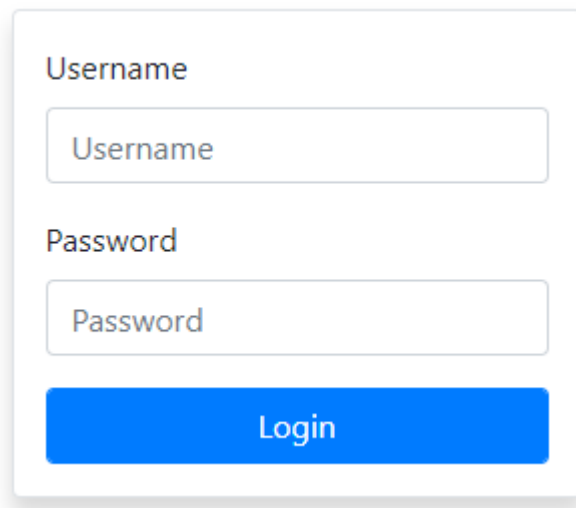
12.1 Accessing the Admin Portal

You can then type `<Intime Server IP Address>:39946/admin` in your browser.

Tip

The default port is 39946. This can be changed using the InTime Server `-aclport` option.

12.2 Logging In

A screenshot of the InTime Server Admin Web Portal login interface. It features a white rectangular box with a subtle shadow. Inside the box, the label 'Username' is positioned above a text input field containing the placeholder text 'Username'. Below this, the label 'Password' is positioned above another text input field containing the placeholder text 'Password'. At the bottom of the box is a prominent blue button with the white text 'Login'.

The username and password can be found in `/admin.txt`. You can change the password in `admin.txt`. There is no need to restart the InTime Server after a change of password – changes take effect immediately.

12.3 License Management

Upon logging in, you will be taken to the License Management page. This is where you can view or upload a new license to the InTime server. If you have started InTime Server without a license configured, this page

will show a license validation error.

License
Toolchain
Client Action
Logout

Choose license file

Browse

Upload

KEY	VALUE
STATUS	MESSAGE
INVALID	LICENSE VALIDATION ERROR

Choose the license file to upload by clicking on the 'Browse' button and proceed by clicking the 'Upload File' button. Note that you can only upload license files that have the file extension '.lic'. If the license is valid, a success message and the license details will appear.

License
Toolchain
Client Action
Logout

Choose license file

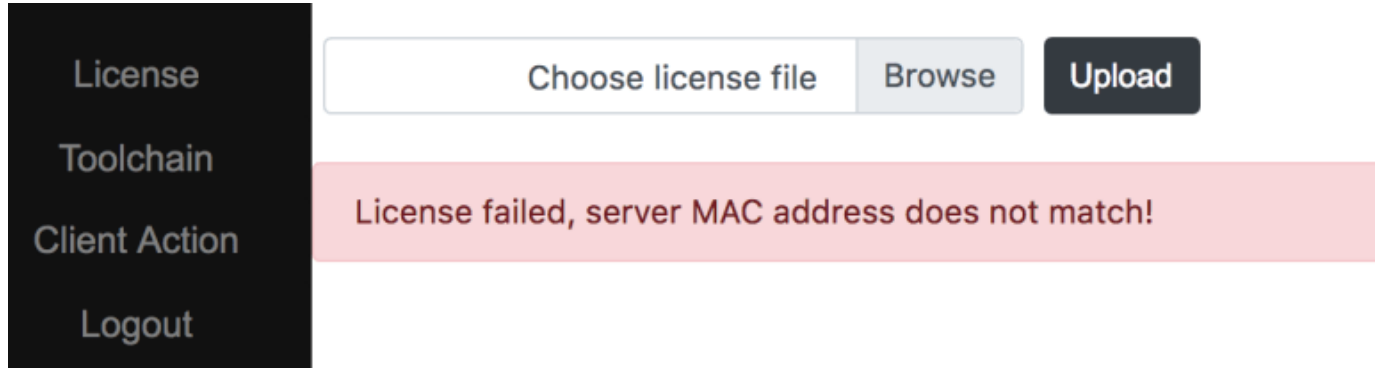
Browse

Upload

Upload success

KEY	VALUE
COMPANY_NAME	1643. Plunify_Test
CONCURRENT_USED	0
CONCURRENT_LEFT	8
CONCURRENT_TOTAL	8
START_DATE	2019-01-15T00:00:00
EXPIRY_DATE	2019-02-14T23:59:29
LICENSE_TYPES	EVAL_PRIVATE_GROUP
LICENSE_VERSION	2
MAC_ADDRESS	1C98EC0F9378

If the license is invalid, an error message will show up, explaining what went wrong.



12.4 Toolchain Management

The Toolchain Management page allows you to add, edit or remove your FPGA tools. At least one toolchain is required for InTime to work in Private Cloud mode. To access the Toolchain Management page, click the 'Toolchain' submenu. The resulting page will display a list of configured toolchains. If a tool's path is accessible by the InTime Server, it will be displayed in green, otherwise in red.

PLUNIFY
License
Toolchain
Client Action
Logout

Toolchain Management

No.	OS	Vendor	Toolchain	Path	License file/server	Edit	Delete
1	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2019.2/Vivado/2019.2	2101@192.168.2.250	Edit	Delete
2	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2020.1/Vivado/2020.1	2101@192.168.2.250	Edit	Delete
3	Linux	Xilinx	Vivado	/mnt/opt/Xilinx/2018.3/Vivado/2018.3	2101@192.168.2.250	Edit	Delete
4	Linux	Microchip	Libero	/mnt/opt1/Microsemi/Libero_SoC_v12.5_SP1/Libero	2102@192.168.2.250	Edit	Delete
5	Linux	Altera	QuartusII	/mnt/opt/Altera/18.0.0/quartus	2100@192.168.2.250	Edit	Delete
6	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2020.2.2/Vivado/2020.2.2	2102@192.168.2.250	Edit	Delete
7	Linux	Xilinx	Vivado	/mnt/opt/Xilinx/2018.3.1/Vivado/2018.3.1	2101@192.168.2.250	Edit	Delete

Add Toolchain

Add Toolchain

To add a toolchain, click the 'Add toolchain' button. Fill in the necessary information and click 'Add Toolchain' to register it.

Fields with * are required

***OS:**

-----Select-----

***Vendor:**

-----Select-----

***Toolchain:**

-----Select-----

***Path:**

/mnt/opt/.....

License file/server:

2100@192.168.1.1

Save

Edit/Delete Toolchain

To edit a registered toolchain, click the 'Edit' link and modify the details accordingly. Click 'Submit' to confirm. To delete a registered toolchain, simply click 'Delete'.

Toolchain Management

No.	OS	Vendor	Toolchain	Path	License file/server	Edit	Delete
1	Linux	Xilinx	Vivado	/mnt/opt1/Xilinx/2019.2/Vivado/2019.2	2101@192.168.2.250	Edit	Delete

12.5 LSF / SGE / PBS Configuration - Client Actions

To use InTime together with LSF (Load Sharing Facility), SGE (Sun Grid Engine) or PBS, additional commands – also known as “Client Actions” – are required. To access the Client Actions page, click the 'Client Action' submenu. The page will display a list of registered Client Actions.

Client Action Management										
No.	Action type	OS	Execute	Arguments	Trigger type	Working directory	Abort job if fail	Edit	Delete	
1	Init	Linux	bsub	\${USER_ARGS} \${INTIME_HOME}/intime_agent.sh -mode background -platform minimal -ip \${INTIME_SERVER} -comport \${INTIME_PORT} -remote_job \${REMOTE_JOB_ID} -max_runs \${AGENT_MAX_RUNS} -no_agent_limit	Concurrent runs		Yes	Edit	Delete	

Add New Client Action

To add a Client Action, click the 'Add Action' button.

Fields with * are required

*Action type

Init

*OS

Linux

*Execute

bsub

Arguments

`${USER_ARGS} ${INTIME_HOME}`

*Trigger type

Concurrent runs

Working directory

*Abort job if fail

Yes

Save

Follow the instructions below to add "Client Actions" for different environments.

LSF

```
Action Type: Init
Execute: bsub
Arguments: ${USER_ARGS} ${INTIME_HOME}/intime_agent.sh -mode background -platform minimal -ip ${INTIME_SERVER} -comport $
{INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit
Trigger type: Concurrent runs
Abort job if fail: Yes
```

SGE

```
Action Type: Init
Execute: qsub
Arguments: ${USER_ARGS} -sync n -S /bin/sh ${INTIME_HOME}/intime_agent.sh -intime_home /opt/tools/intime -mode background -platform
minimal -ip ${INTIME_SERVER} -comport ${INTIME_PORT} -remote_job ${REMOTE_JOB_ID} -max_runs ${AGENT_MAX_RUNS} -no_agent_limit
Trigger type: Concurrent runs
Abort job if fail: Yes
```

PBS

```
Action Type: Init
Execute: qsub
Arguments: ${INTIME_HOME}/intime_agent.pbs -v INTIME_HOME=${INTIME_HOME}, IP=${INTIME_SERVER}, COMPORT=${INTIME_PORT}, REMOTE_JOB=${
REMOTE_JOB_ID}, MAX_RUNS=${AGENT_MAX_RUNS}
Trigger type: Concurrent runs
Abort job if fail: Yes
```

Edit Client Action

To edit a registered Client Action, click the ‘Edit’ and modify the corresponding toolchain. Click ‘Submit’ to confirm.

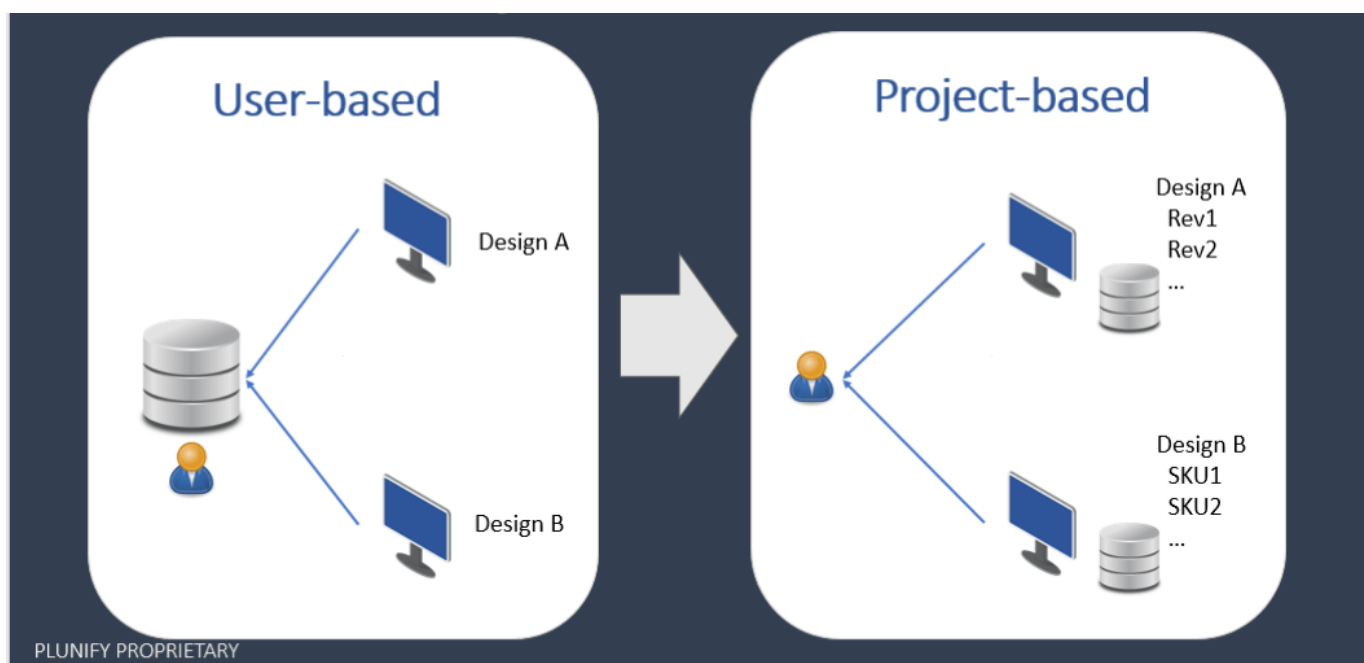
To delete a registered Client Action, simply click ‘Delete’.

13. Database Mode

The data generated in InTime is saved in a highly portable encrypted database file named "intimeruns.db". By default, InTime runs in "project" mode, as opposed to "user" mode.

13.1 Project Mode versus User Mode

The key difference is where the InTime database file is stored. This mode also affects your ability to view and use the data and insights that InTime accumulates.



By default, the InTime database for each project is created and stored underneath the FPGA project folder. The advantage is that this enables users to use source revision control, e.g. git, on the database file and have individual database files for different projects. Any user with sufficient file permissions will thus be able to access the database.

In User mode, the database file is saved within the `<user home>/plunify/` folder structure. All InTime-generated data, regardless of project, is saved here in a single file. A user may have many different projects and may wish to keep the data in a single static database, inaccessible to other users.

Comparison	Project Mode	User Mode (Default)
File Location	<code><project folder>/plunify.jobs/</code>	<code><user home>/plunify/</code>
Design data	Only this project's results. Can be multiple users.	All projects run by this user are saved.
Design visibility	All data should be visible by default.	Only active project is visible by default. Other results can be imported or unhide.

13.2 Switching Database Modes

To switch to User mode, enter this command in the Tcl Console:

```
misc set runs_db user
```

Or back to Project mode:

```
misc set runs_db project
```

13.3 Check Mode

To check what mode you are in, enter this command:

```
misc get runs_db
```

14. Quick Start for InTime

14.1 1. Start InTime



After installation, run InTime by double-clicking the InTime desktop shortcut (shown on the left), which should appear on your desktop after a successful installation.

Alternatively, open a commandline terminal and enter the following command:

OS	Path
Linux	<code><InTime installation directory>/intime.sh</code>
Windows	<code><InTime installation directory>/intime.exe</code>

There are additional arguments if you are running in Tcl mode or batch mode. Refer to InTime arguments for more information.

14.2 2. Install the InTime license and configure FPGA vendor tool settings

Refer to Single Server configuration page to install the license and configure the FPGA vendor's tools.

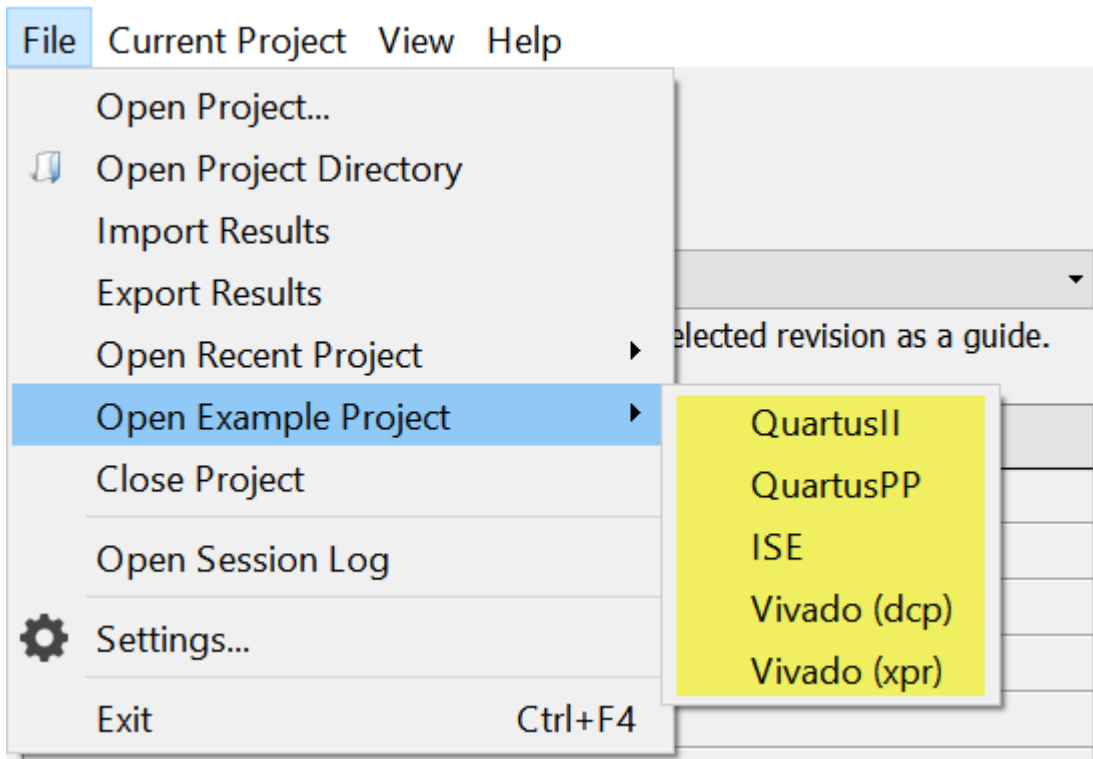
You can skip FPGA vendor tool configuration if the required FPGA tool has already been set up in your environment. Simply start InTime with the `-tc <toolchain name>` and it will pick up the right FPGA vendor tool automatically. Refer to the Quick Setup page.

Example: to automatically register the Vivado tool,

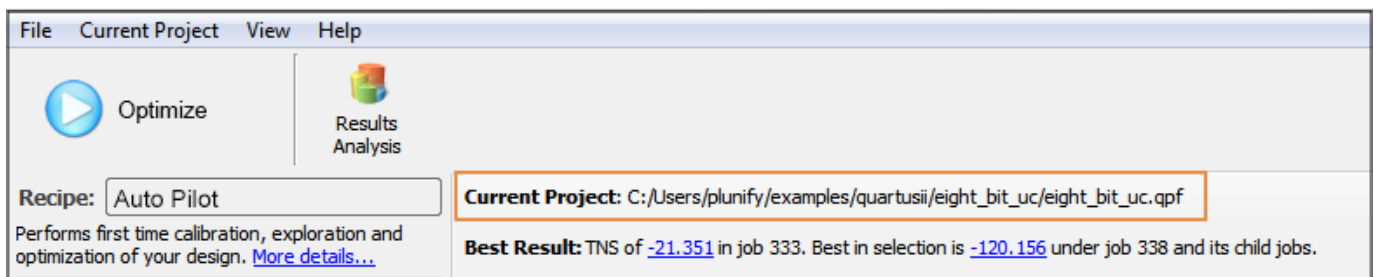
```
$ ./intime.sh -tc vivado
```

14.3 3. Open An Example Project

Once the FPGA vendor tools have been registered, go to *File -> Open Example Project*. A list of possible projects based on your InTime license and FPGA vendor tools will be displayed.



Select the right project and click to open your FPGA project. If successful, the project name will be displayed, similar to the one shown below



The next step is to select an InTime recipe. A recipe represents a compilation and learning flow.

14.4 4. Run the default Auto Pilot Recipe

The easiest way to get started is to run the "**Auto Pilot**" recipe.

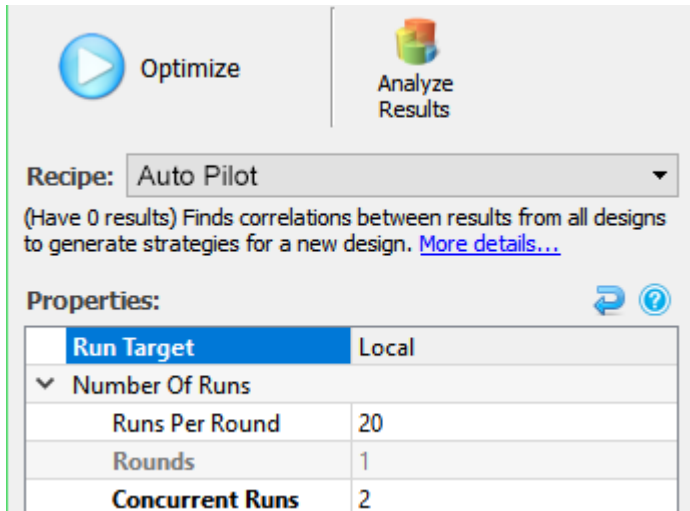
What is the "Auto Pilot" recipe?

This recipe reads existing reports in your FPGA project to determine the type of design challenge, for instance, a placement, routing or timing failure. Then Auto Pilot will recommend appropriate flows to run in order to achieve the performance target.

Configure Flow Properties

Set your compute resources by configuring the following properties.

- Run Target: **Local** (Runs all compilations on the same machine.)
- Concurrent Runs: **4** (Set this to a number based on how many compilations your machine can run in parallel.)



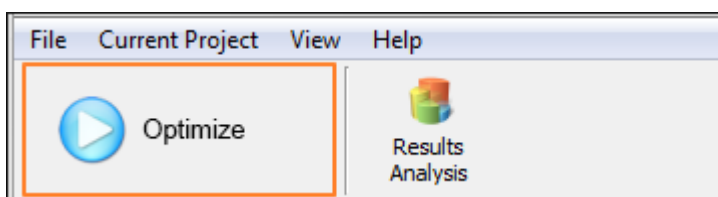
if you are running on multiple machines (Private Cloud), update the flow properties to match the following:

```
Run Target      : Private Cloud
Concurrent Runs : 4 (Set this to the number of compilation machines you are using.)
```

Once that is done, jump to the "Start Optimization" section.

14.5 5. Start Optimization

Click the "Optimize"" button as shown below



A simple wizard appears with two choices: "Guided" or "Solution Driven". Select "Solution Driven" if you already know the type of challenge that your design is facing:



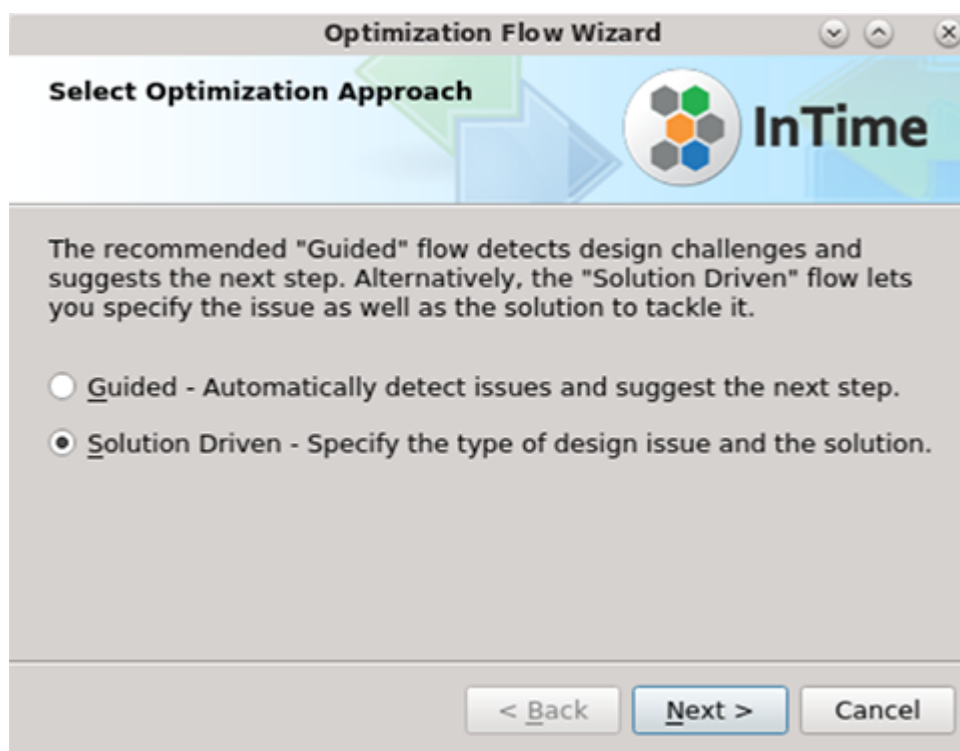
Supported challenges

Supported design challenges are different depending on the target device and FPGA tool.

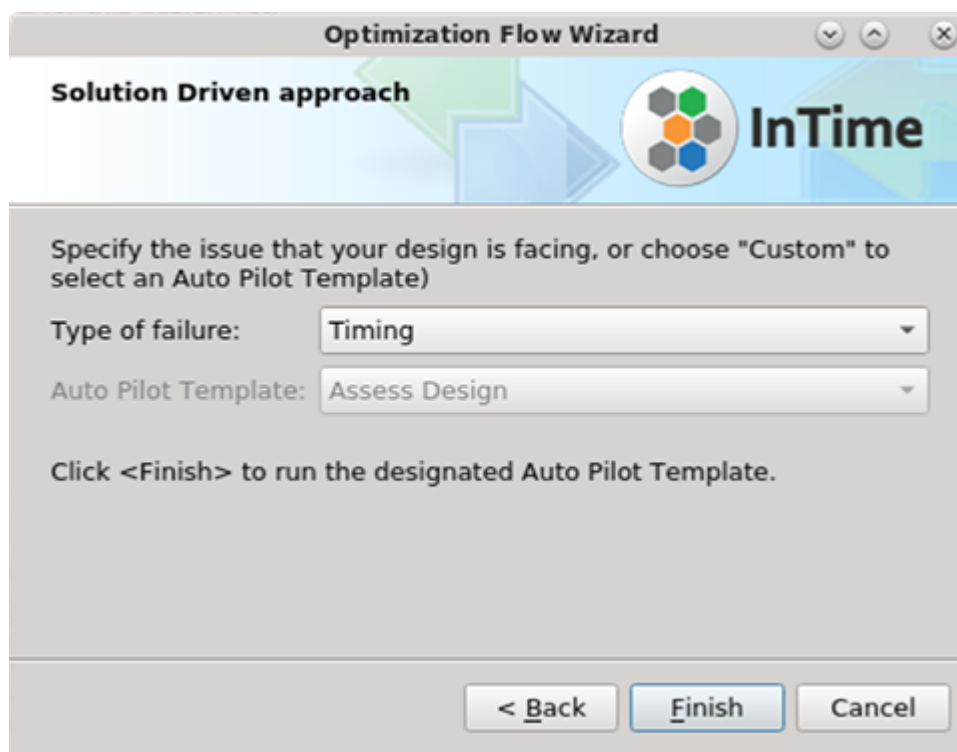
- Solution Driven: Specify the type of challenge your design is facing, and run the corresponding flow.
 - "Synth" (Synthesis): Errors in synthesis.
 - "Place" (Placement): Challenges in local, global placement, congestion and multi-die interconnect limitations.
 - "Route" (Routing): Congestion is causing node overlaps or inability to route every signal.
 - Timing: Design does not meet all its timing constraints.
 - Custom: Advanced option for users who create their own Auto Pilot Templates.
- Guided: Let InTime detect your existing results and recommend next steps.

Solution Driven Approach

Here is an example of the Solution Driven approach:



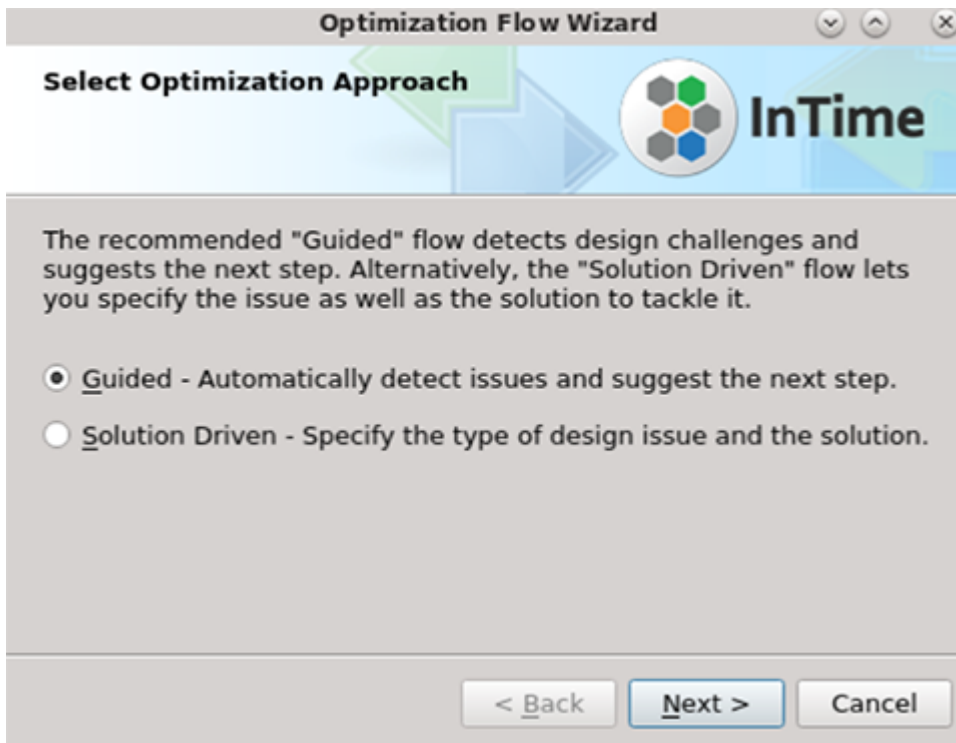
1. Click Next to continue to the next screen.



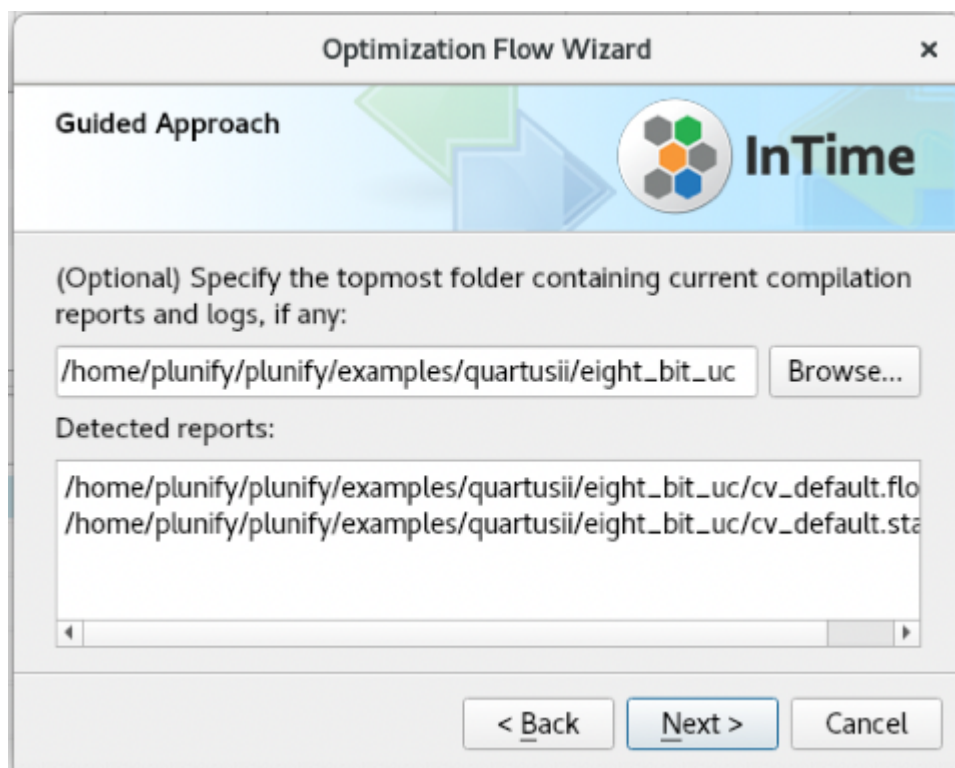
2. Indicate the type of challenge that you are facing, and click Finish. InTime will run a flow that addresses the selected design challenge.

Guided Approach

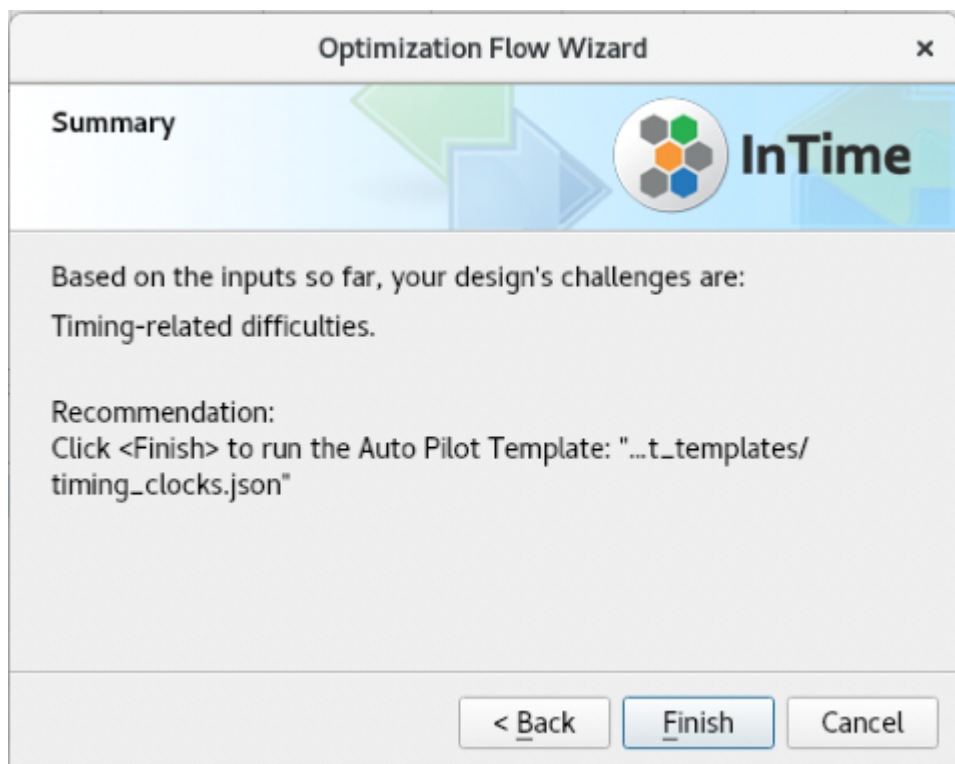
Here is an example of the Guided approach:



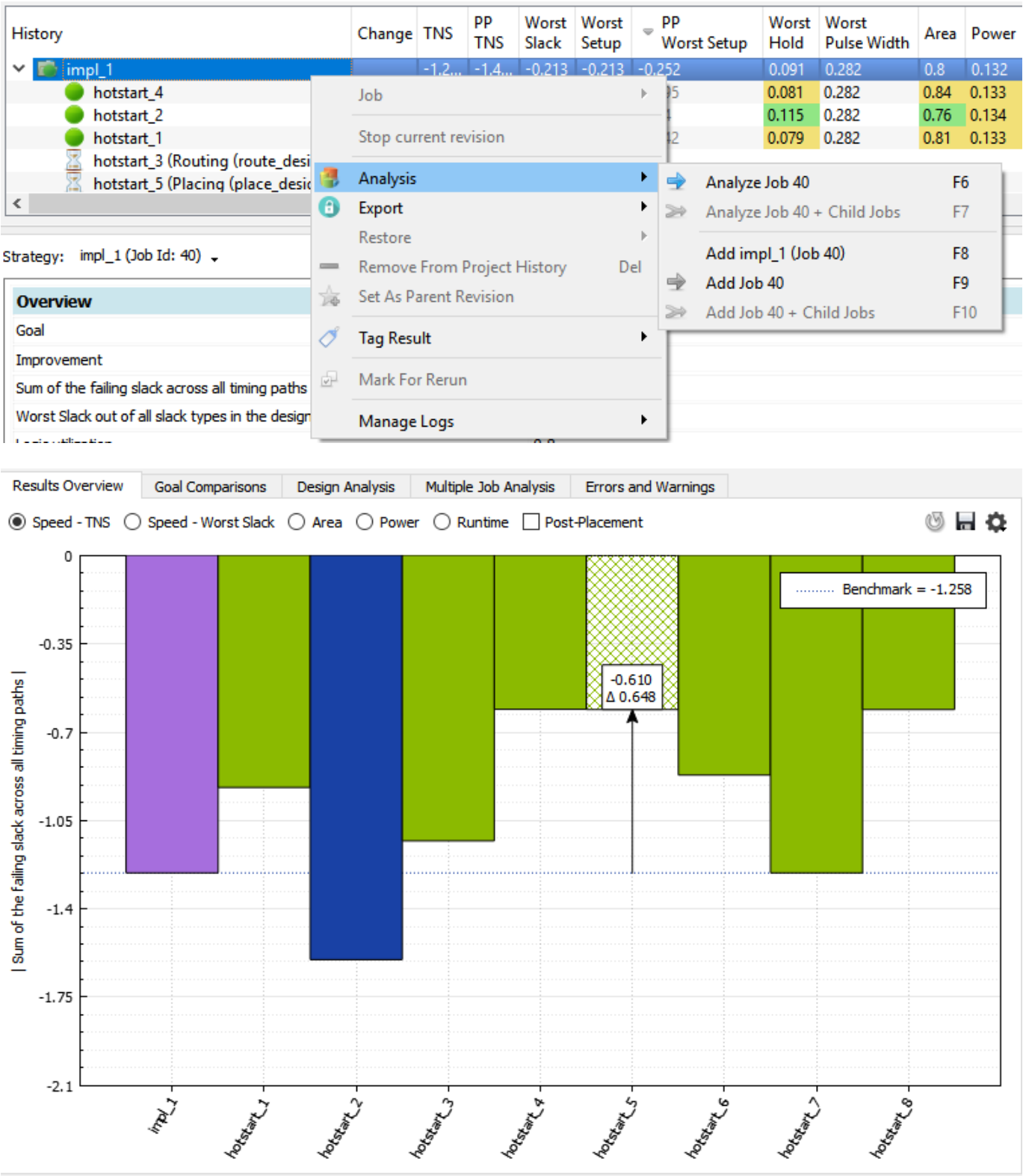
1. InTime detects the existing compilation results in your project. If the reports and logfiles are in a non-standard directory, specify the location and InTime will try to detect them.



2. After reading the existing results, InTime displays the detected design challenge and suggests a corresponding flow.
 - a. Click Finish to run the suggestion, or
 - b. Cancel and go back to specify the design challenge in the Solution Driven approach.



Right-click and select "Analyze Job XX + Child Jobs" to see the rate of improvement and results across jobs.



Refer to the Analyze Results page for an explanation of all the features.

14.7 7. Export Selected Result

When you have obtained a good result, you can export it to your FPGA software to verify the result. The TNS and WNS values must correspond to those reported by InTime. Please refer to "Export InTime Results" page for more details.

15. Quick Start for InTime in Tcl Mode

15.1 Start InTime

Using a command line shell, a typical way to start InTime is as such below

```
intime.sh -mode batch -project <proj> -s intimeflow.tcl
```



For Vivado users

- For project-mode, use a XPR file for the `<proj>` option.
- For non-project mode-, use the a tcl build script for the `<proj>` option.



Tip

You can skip toolchain configuration if the environmental variables has already been set up. Simply start InTime with the `-tc <toolchain name>`. Example: `intime.sh -tc vivado`. It will pick up the right toolchain automatically. See this kb - Auto-detect FPGA toolchain and license information

15.2 Configure the InTime license and FPGA tool

Refer to single seat configuration page to specify the license in the script and configure the toolchain.

You can skip toolchain configuration if the environmental variables have already been set up. Simply start InTime with the `-tc <toolchain name>`. It will pick up the right toolchain automatically. Refer to the Quick Setup page.

Example: to automatically register the toolchain for vivado,

```
$ ./intime.sh -tc vivado
```

15.3 Writing the Tcl script

This is a sample script which works in Windows & Linux environments. You can download it from Plunify's github account.

```
# Adjust the run_target, runs_per_round according to your recipe
flow reset
flow set run_target local
flow set runs_per_round 2
flow set rounds 1
flow set concurrent_runs 1
flow set control_create_bitstreams false
flow load_recipe "hot_start"
flow run_recipe "hot_start"
```

 **Tip**

Plunify recommends starting with the *Hot Start* recipe at the beginning for Vivado, Quartus and Libero, and the *InTime Default* recipe for ISE.

Understanding the script

1. Reset the flow. This prevents an earlier job settings from affecting this new job.
2. Set the *run_target* to *local*. This will run locally in the machine instead of being distributed to other InTime capable machines
3. Set the number of runs (builds) per round to 2
4. Set the rounds to 1
5. Do not create bitstream
6. Start the "hot_start" recipe

For more information about flow properties such as *run_target*, please refer to Flow Properties.

16. Getting Started Videos

16.1 Register your InTime license

This video shows how you register your license.

16.2 Register Vendor Toolchain

This video shows how you can setup the necessary FPGA software for InTime. For Windows user, please use the auto-detect function.

16.3 Register your InTime server license

This video shows how you can register the license for InTime server. This is applicable only to Group and Enterprise editions (Linux only).

16.4 Configure InTime using Cluster mode

This video shows how you can setup your InTime clients using Cluster mode. This is applicable only to Group and Enterprise editions (Linux only).

16.5 Start the Optimization Flow

This video shows how you can quickly start InTime within a few clicks.

16.6 Compare strategies

This video shows how you can easily compare 2 strategies after getting your results.

16.7 Export strategies

This video shows how you can export the best or selected strategy into a bitstream file or export it to a tcl script file.

16.8 Lock down certain Synthesis, Place & Route settings

This video shows how you can always include important settings using the Setting Filters Locklist feature.

16.9 Rerun results / strategies

This video shows how you can select and rerun specific results to save time after a design change.

16.10 Export results to a file

This video shows how you can export InTime results to an external file, so that you can share them with another project or another user..

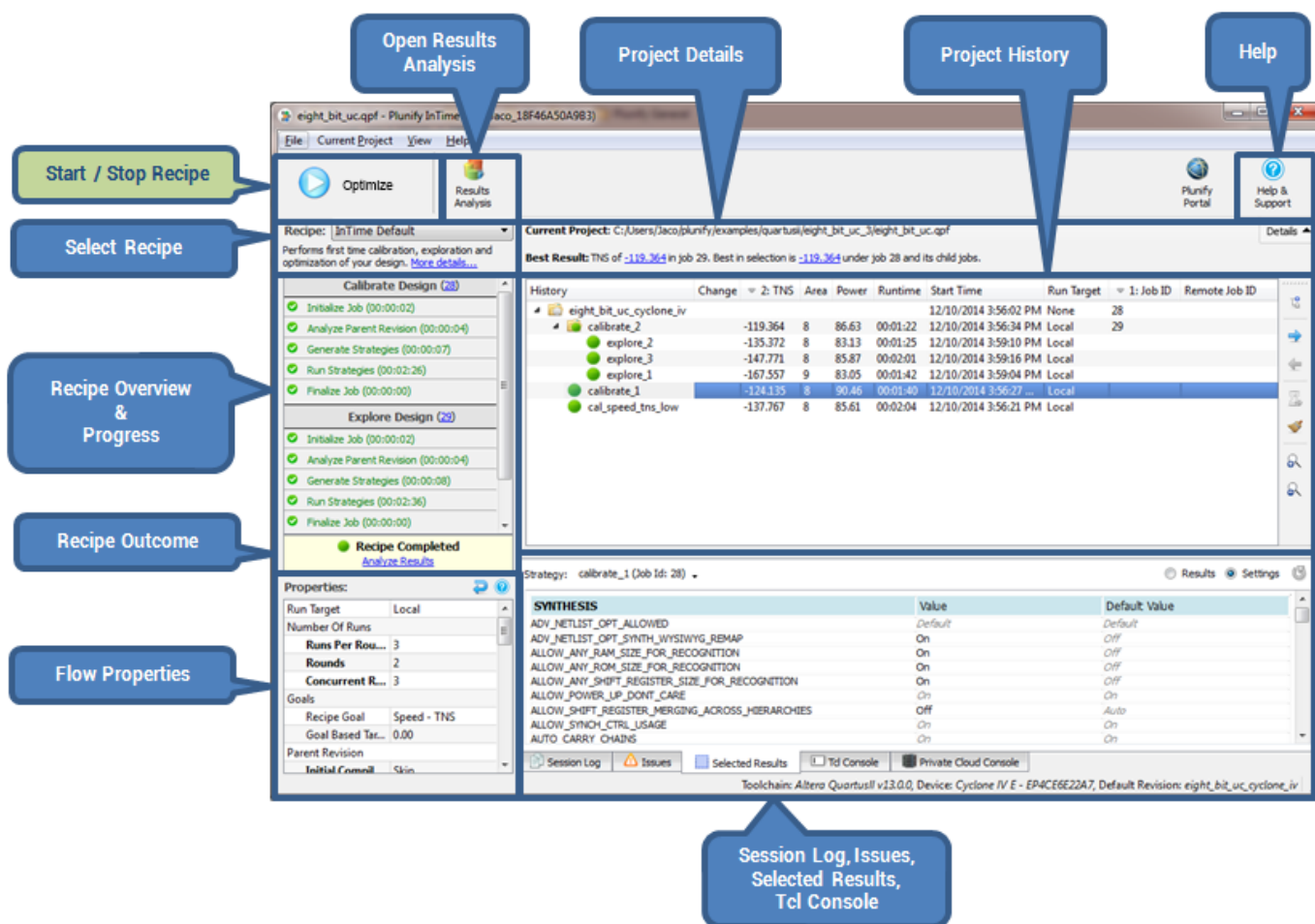
16.11 Import results from a file

This video shows how you can import results from an external file that was exported from InTime.

17. Navigating the InTime GUI

17.1 InTime GUI


The InTime GUI uses a single "**Optimize**" button in the top left corner to start and stop a build..




The left side focuses on the active recipe and the InTime flow. The center-right portion focuses on the current project and the section below that provides tabbed panels of details about the active recipe, current project and InTime status.

17.2 Project History

The project history keeps track of all InTime runs on a **per project** basis. InTime updates this history while a recipe is running to give continuous updates on which strategies are run as well as the outcomes. Each round is given a job ID and denoted with a folder icon. If there are multiple rounds, each round is organized in a tree format. To expand a round, simply click on the arrow icon next to the round. Note that the best result (e.g. TNS) in each round act as the "**parent revision**" for the next round. The highlighted row in the image below is called the "**root revision**".



History	Change	▼ 2: TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width	Area	Power	Fmax	Runtime	Start Time	Run Target	1: Job ID	Remote Job ID	Tag
▼ impl_1		-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:05:27	2019-07-17 13:59:...	Local	13		
▶ idefault_1	1.652	-0.272	-1.329	-0.064	-0.064	-0.254	0.100	0.282	0.11	0.266	462.11	00:18:53	2019-07-17 14:13:40	Local	14		InTime Def
▶ idefault_3	1.567	-0.357	-0.469	-0.161	-0.161	-0.177	0.143	0.282	0.09	0.301	442.28	00:13:41	2019-07-23 11:39:28	Local			InTime Def
▶ cal_speed_tns_low_1	1.147	-0.777	-0.632	-0.166	-0.166	-0.158	0.146	0.282	0.09	0.299	441.31	00:13:40	2019-07-17 14:13:24	Local			InTime Def
▶ idefault_4	1.073	-0.851	-0.59	-0.204	-0.204	-0.182	0.100	0.282	0.09	0.303	434.03	01:11:07	2019-07-23 11:39:47	Local			InTime Def
▶ idefault_7	0.947	-0.977	-1.117	-0.199	-0.199	-0.296	0.058	0.282	0.12	0.275	434.97	00:41:44	2019-07-23 12:52:36	Local			InTime Def
▶ idefault_5	0.38	-1.544	-1.526	-0.278	-0.278	-0.307	0.106	0.282	0.09	0.299	420.52	00:11:46	2019-07-23 12:48:51	Local			InTime Def
▶ impl_1		-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:05:51	2019-07-03 14:47:19	Local	4		
▶ impl_1		-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:04:35	2019-07-03 10:16:17	Local	2		



What is parent revision?

Each round has a **"parent revision"** which is the point of reference for generating strategies and determining result improvements. Read more under **flow properties**.

Project History Columns





The default visible columns in the project history

Column Name	Description
History	This is the strategy / revision name, usually named after the recipe name.
Change	TNS difference between the root revision and the current strategy
TNS	Total Negative Slack of the current strategy
PP TNS	Post placement TNS timing estimate.
Worst Slack	Worst Slack out of the 3 reported slacks
Worst Setup	Worst Setup Slack
PP Worst Setup	Post placement Worst Setup timing estimate
Worst Hold	Worst Hold Slack reported by the FPGA tool
Worst Pulse Width	Worst Pulse Width reported by the FPGA tool
Area	Utilization (%) reported by the FPGA tool
Power	Power reported by the FPGA tool
FMax	FMax based on the fastest clock in the design (autoamtically selected by InTime)
Start Time	Start Time of the strategy in YYYY-MM-DD HH:MM:SS
Run Target	Local, Private Cloud or Public Cloud
Job ID	Job ID assigned to this round based on this local machine
Remote Job ID	Unique Job ID assigned to this round assigned by InTime Server
Tag	Editable placeholder for remarks. Default value is based on recipe detatils. Click on it to edit.

To hide a column, go to **View -> Select Columns** and uncheck the column to hide it.

Project History Icons

In the GUI, you will come across a few icons in the project history to indicate the state of strategies.

Icon	Description
	Strategy has not started yet or stopped.
	Strategy is currently being run locally.
	Strategy is currently being run on a remote target.
	Strategy was completed successfully but the design goal was not met.
	Job folder with strategies. Click to expand folder.
	Strategy was completed successfully and the design goal was met.
	Strategy completed but with unrouted nets.
	Strategy failed.
	Maximum run time exceeded.
	Strategy set as a parent revision

17.3 Select Recipes

Recipes are different optimization approaches. Refer to the recipes page for more information.

17.4 Flow Properties

On the bottom left is the **Flow Properties**. Flow properties specify how you want to control your builds, e.g number of rounds, maximum runtime. Refer to the flow properties page for details of each property.

17.5 Session Log & Issues

Right at the bottom, this tab displays the InTime session log. It will show the build status and errors (if any) that InTime encounters when it is running.

```

80 16:16:57 [Info ] [1] SUCCESS : 40 result(s) available based on training filter.
81 16:16:57 [Info ] [1] SUCCESS : Removed unpopulated/duplicate results for goal "speed_tns".
82 16:16:57 [Info ] [1] SUCCESS : Removed estimated results for goal "speed_tns".
83 16:16:57 [Info ] [1] SUCCESS : Training data directory check.
84 16:16:58 [Info ] [1] SUCCESS : Successfully prepared 20 result(s).
85 16:16:58 [Info ] [1]
86 16:16:58 [Info ] [1] PREPARE TRAINING DATA COMPLETED. (Elapsed Time: 00:00:01)
87 16:16:58 [Info ] [1]
88 16:16:58 [Info ] [1]
89 16:16:58 [Info ] [1] LEARN FROM PAST RESULTS (hotstart_impl_1)
90 16:16:58 [Info ] [1] =====
91 16:16:59 [Info ] [1]
92 16:16:59 [Info ] [1] LEARN FROM PAST RESULTS (1/4): Z2xt (Speed - TNS) -> Preparation
93 16:16:59 [Info ] [1] -----
94 16:16:59 [Info ] [1]
95 16:16:59 [Info ] [1] **** R Generate Statistics Task Started. This may take a while. ****
96 16:16:59 [Info ] [1] **** R Generate Statistics Task Ended. Elapsed Time: 00:00:00.371 ****
97 16:16:59 [Info ] [1] SUCCESS : Regression threshold of 3 = 1.089 which will be used for learning criteria.
98 16:16:59 [Info ] [1] SUCCESS : Criteria TNS < 1.089
99 16:16:59 [Info ] [1] **** Statistics [R] Task Started. This may take a while. ****

```

Session Log Issues Selected Results Td Console Private Cloud Console

The Issue tab filters the session log and displays "Warnings" and "Errors" only.

```

1 16:17:25 [Error ] [1] FAILED : Failed to extract actual revision name used for strategy "idefault_2". This str
ignored during the rest of the flow.
2 16:17:25 [Error ] [1] FAILED : Failed to extract actual revision name used for strategy "idefault_1". This str
ignored during the rest of the flow.
3 16:17:25 [Error ] [1] FAILED : Failed to extract actual revision name used for strategy "cal_speed_tns_low". Th
be ignored during the rest of the flow.
4 16:17:25 [Error ] [1] FAILED : No valid strategies remain after actual revision name extraction. Flow cannot c
5 16:17:34 [Error ] [1] Error Summary:
6 16:17:34 [Error ] [1] Process: GENERATE STRATEGIES | 16:17:25 | FAILED : Failed to extract actual revision name
strategy "idefault_2". This strategy will be ignored during the rest of the flow.
7 16:17:34 [Error ] [1] Process: GENERATE STRATEGIES | 16:17:25 | FAILED : Failed to extract actual revision name
strategy "idefault_1". This strategy will be ignored during the rest of the flow.
8 16:17:34 [Error ] [1] Process: GENERATE STRATEGIES | 16:17:25 | FAILED : Failed to extract actual revision name
strategy "cal_speed_tns_low". This strategy will be ignored during the rest of the flow.
9 16:17:34 [Error ] [1] Process: GENERATE STRATEGIES | 16:17:25 | FAILED : No valid strategies remain after actu
extraction. Flow cannot continue.
10 16:17:34 [Error ] [1] The full log details can be found at : C:\Users\Kirvy\.plunify\Kirvy_F8597120F328\log\intime

```

Session Log Issues Selected Results Td Console Private Cloud Console

17.6 Selected Results

When you click on a result, the details are display in the **Selected Results** tab. There are 2 views, a results view and a settings view. This is controled with the radio buttons on the right.

Strategy: hotstart_5 (Job Id: 40) ▾

Overview	
Goal	Speed - TNS
Improvement	0.648
Sum of the failing slack across all timing paths	-0.61
Worst Slack out of all slack types in the design	-0.131
Logic utilization	0.8
Power dissipation	0.133
Strategy compilation time	00:09:40

Most Clock summary:

Session Log Issues Selected Results Td Console

Strategy: hotstart_5 (Job Id: 40) ▾ Results

Results	
SET_POWER_OPT_CELL_TYPES	none
PLACE_DESIGN	none
CLOCK_MARGIN	DISABLE
DIRECTIVE	SSI_BalanceSLLs
INCREMENTAL_COMPILE	DISABLE
NO_BUF_OPT	FALSE
NO_FANOUT_OPT	FALSE
PBLOCK	DISABLE
SLR_ASSIGNMENT	DISABLE
POST_PLACE_POWER_OPT_DESIGN	
IS_ENABLED	0
PHYS_OPT_DESIGN	

Session Log Issues Selected Results Td Console

To learn more about working and managing InTime results, refer to the review results page for more explanations.

17.7 Tcl Console

A Tcl console in the GUI to execute Tcl commands.

```
Welcome to Plunify InTime Client v2.6.11 (Build 5366fff)
Runtime messages will be logged to C:\Users\Kirvy\plunify\Kirvy_F8597120F328\log\intime.log

plunify> source "C:/Program Files/Plunify/InTime/v2.6.11/bin/./scripts/startup.tcl"
plunify> project open "C:/Users/Kirvy/plunify/examples/vivado/eight_bit_uc_xpr/eight_bit_uc_xpr" -toolch
Successfully opened project C:/Users/Kirvy/plunify/examples/vivado/eight_bit_uc_xpr/eight_bit_uc_xpr.
plunify> |
```

Session Log Issues Selected Results Td Console

Toolchain: Xilinx Vivado v2018.3.0, Device: xc7k70tfg484-2, Default Revision: impl_1, T

For example, to get an overview of a project's history, just type `project history`.

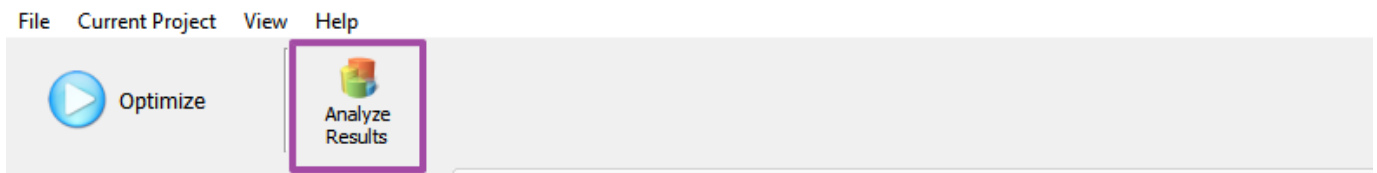
```
plunify> project history
```

Job ID	Strategy	Improvement	Timing Score	RunState
2049	/eight_bit_uc		10.407	RunDone
2049	-educated_1	-9.294	1.113	RunDone
2050	/eight_bit_uc		10.407	RunDone
2050	-educated_1	-3.422	6.985	RunDone
2050	-educated_2	-7.595	2.812	RunDone
2050	-educated_3	-5.792	4.615	RunDone

A Tcl command reference guide can be found [here](#).

17.8 Analyze Results

Additional analysis features can be accessed by clicking on the button "Analyze Result" in the InTime GUI.



Refer to the analyze results page for detailed explanation.

18. Deciding which recipe to use

The InTime optimization flow executes Tcl scripts called *Recipes*. These are different optimization approaches for different design conditions. (For an overview of the InTime flow, see the [intime flow page](#).)

18.1 How to run a Recipe

To start a recipe in the InTime GUI, just click the *Optimize* button.

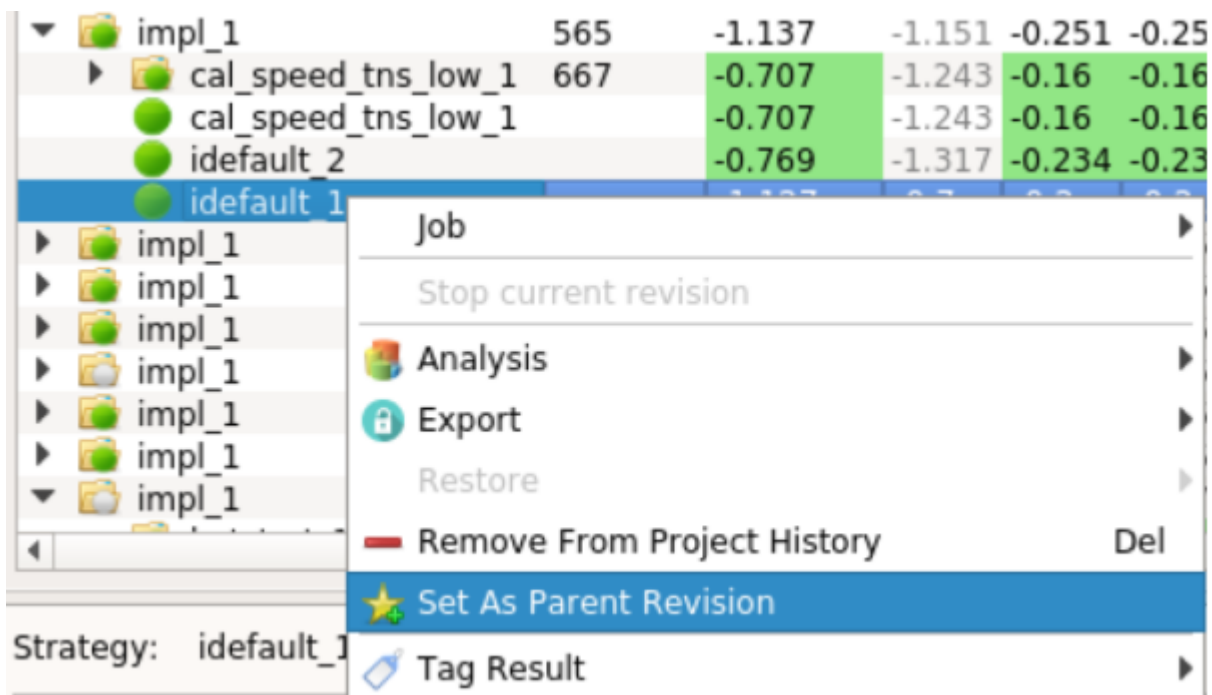
In **Tcl command line** mode, use the following commands.

```
# List the available recipes:
plunify> flow recipes list
"intime_default" "placement_seed_exploration" ...

# Run the InTime Default recipe:
plunify> flow load_recipe intime_default
plunify> flow run_recipe intime_default
```

18.2 What is a Parent Revision?

Multiple recipes can be executed in a hierarchical manner where the a result of the current round (usually the result with the best WNS or TNS) becomes the starting point (usually called the "Parent Revision") of the next round. If the same recipe is running multiple rounds, the parent revision is selected automatically based on the goal target (either WNS or TNS) of the recipe.



To select a recipe, right-click on the best strategy/result so far and set the result as the parent revision of the next round as shown below

Once the custom parent revision has been set, it will be marked with a star as shown below

▼	impl_1	565	-1.137	-1.151
▶	cal_speed_tns_low_1	667	-0.707	-1.243
	cal_speed_tns_low_1		-0.707	-1.243
	idefault_2		-0.769	-1.317
	★ idefault_1		-1.127	-0.733
▶	impl_1	543	-1.137	-1.151
▶	impl_1	517	-1.137	-1.151
▶	impl_1	495	-1.137	-1.151

Tcl Mode

The `flow set parent_revision_name` and `flow set parent_revision_job_id` commands can be used.

18.3 Understanding InTime Optimization Phases

The FPGA tools offers many build parameters that affect an FPGA design at a global as well as localized block level. InTime determines the optimum build parameters and constraints for your design. To deal with an enormous design space, InTime uses machine learning techniques and domain-specific heuristics to predict and narrow down the best parameters and constraints. To maximize performance closure effectiveness, it is necessary to generate sufficient data points from build results and learn from past results. There are two phases to the optimization process: Phase 1 is the “Learning” cycle and Phase 2, the “Last-Mile”.

Phase 1: Learning

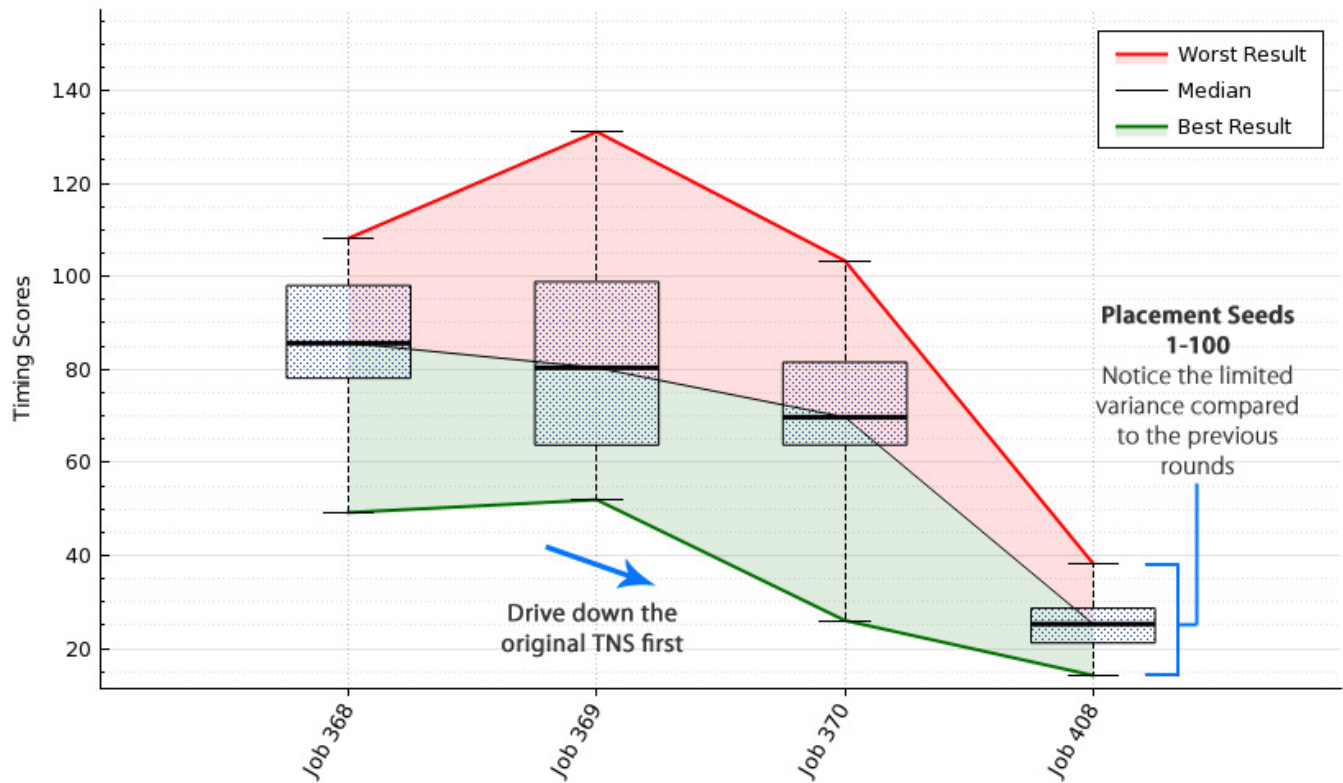
In this phase, the recommended methodology is to progressively optimize a design over several rounds of synthesis and place-and-route builds in an iterative “build-and-learn” cycle.

Phase 2: Last-Mile

The second phase begins when at least one of the Learning results is close to meeting your performance target or if results have stopped improving in Phase 1. In the former, the optimization relies on specific techniques that stimulate relatively non-deterministic (compared to those in Phase 1) variations in the results. There are two types of optimizations in this phase:

1. **Random** - Running placement exploration, effort levels and exploiting clock uncertainties.
2. **Incremental** - Using a particular build to run iterative physical optimizations.

Using this approach, run Phase 1 recipes to improve the TNS or WNS first, followed by Phase 2 recipes. The ideal effect is highlighted in the chart below.



For more information, refer to our whitepapers [here](#).

18.4 List of Recipes

Here is a list of recipes and their aliases. Alias are used in Tcl commands to invoke recipes. Depending on the FPGA vendor and device type, not all recipes will be available.

Recipe Name	Alias	Vendor
Auto Floorplan	auto_floorplan	*AMD, *Altera, *Microchip
Auto Pilot	auto_pilot	AMD, Altera, Microchip
Auto Placement	auto_placement	Altera
Clock Exploration	clock_exploration	AMD, Altera, Microchip
Clock Route Exploration	clock_route_exploration	Altera
Clock Margin Exploration	clock_margin_exploration	AMD
Compile With a Guide File	vivado_incremental_compilation	AMD
Custom Flow	custom_flow	AMD, Altera
Deep Dive	deep_dive	AMD, Altera
Effort Level Exploration	effort_level_placement	Altera
Extra Opt Exploration	extra_opt_exploration	AMD, Altera
Fanout Exploration	fanout_exploration	Altera
Hot Start	hot_start	AMD, Altera
InTime Default	intime_default	AMD, Altera, Microchip
Just Compile My Design	just_compile_my_design	AMD, Altera, Microchip
Just Synthesize My Design	just_synthesize_my_design	AMD, Altera
Max Delay Exploration	max_delay_exploration	AMD, Altera, Microchip
Placement and Router Effort Level Exploration	effort_level_placement_router	Altera
Placement Exploration	placement_exploration	AMD, Microchip
Placement Seed Exploration	placement_seed_exploration	Altera, Microchip
Region Exploration	region_exploration	Microchip
Rerun Strategies	rerun_strategies	AMD, Altera, Microchip
Rerun Best results	rerun_best	AMD, Altera, Microchip
Seeded Effort Level Exploration	seeded_effort_level_exploration	Altera
Synthesis Exploration	synthesis_exploration	AMD

Note

InTime Default Extra has been replaced by specific Auto Pilot templates - refer to this page Router Effort Level Exploration, SSI Exploration have been deprecated.

* Not all devices are supported at this time. AMD: most multi-die devices are supported. Microchip: only certain families.

18.5 Phase 1: Learning Recipes

Also referred to as **educated recipes**, InTime machine learning capabilities to learn from previous results' and produce smarter strategies on subsequent runs. There are multiple Learning recipes.

Recipe Availability

Different recipes may be available across different FPGA vendor tools.

Auto Floorplan

If your design has placement and/or routing difficulties, run this recipe first. Auto Floorplan analyzes the inherent congestion (user-induced or otherwise), connectivity and timing criticality of the design instances before generating floorplans to solve the issues.

Clock Exploration

This recipe selects certain clocks and varies their clock constraints in intermediate compilation stages in order to improve design performance. The user's original constraints are not affected for final timing analysis.

Hot Start

This recipe uses Placement and Routing settings to generate the initial strategies for a project that is being optimized for the first time. The intention is to limit the design space and improve the timing performance in fewer number of compilations.

Tip

Only for Vivado. 50% of the total number of strategies will be generated using a new Hot Start algorithm (from InTime 3.1 onwards). Use the flow property `strategy_cls_multiplier` to control the number of strategies.

Tip

Only for Quartus. Some generated strategy names may have a "amf_" prefix. This means that InTime has applied fanout optimization on the design.

InTime Default

This is a recipe which runs multiple iterations (or rounds). This can be configured under Flow Properties. It will optimize Synthesis, Placement and Routing settings, creating a large variation in results.

The expected project history after running this with a default flow configuration (2 rounds, 3 runs per round) can be seen in the project history shown below. Note that after each round, the recipe will set the best result (TNS) from the current round(s) as the parent of the new round. In the example below, the best result is "cal_speed_tns_low_1" strategy. InTime automatically uses it as the "Parent" for the next round.

History	1: Job ID	2: TNS	PP TNS	Worst Slack	Worst Setup
▼ impl_1	565	-1.137	-1.151	-0.251	-0.251
▼ cal_speed_tns_low_1	667	-0.707	-1.243	-0.16	-0.160
cal_speed_tns_low_2 (Routing ...)					
idefault_1					
idefault_2					
cal_speed_tns_low_1		-0.707	-1.243	-0.16	-0.160
idefault_2		-0.769	-1.317	-0.234	-0.234
idefault_1		-1.127	-0.733	-0.255	-0.255

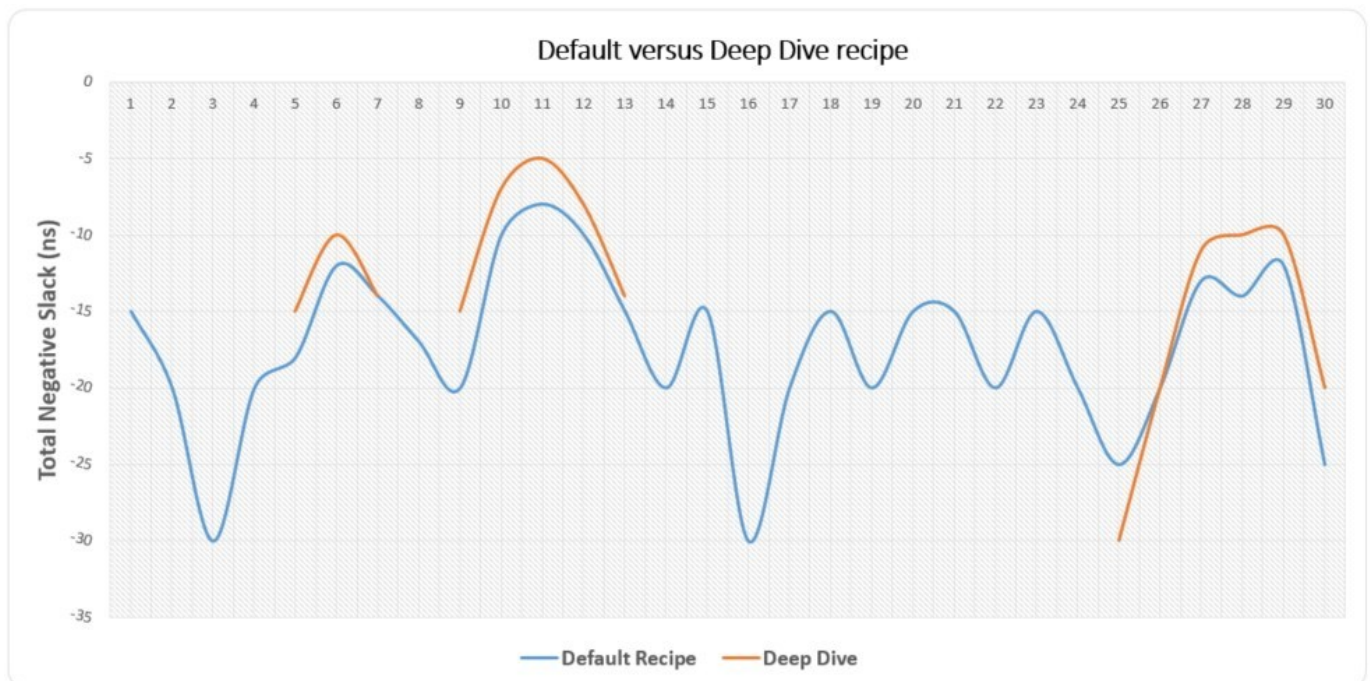
The effects of machine learning on a design can also be visualized using the *Multiple Job Analysis* plot in InTime's Results Analysis mode.

Tip

50% of the total number of strategies will be generated using a new Default algorithm (from InTime 3.1 onwards). Use the flow property strategy_xp_multiplier to control the number of strategies.

Deep Dive

This recipe analyzes existing results and explores regions close to the good results so far. Instead of exploring too many settings, this recipe will lock down settings that are already good and only explore a subset of settings. In the figure below, deep dive recipe gives better results over the default recipe.



Note that there must be a sufficient number of results in order for Deep Dive to work properly.

Fanout Exploration

This recipe discovers appropriate fanout limits for high fanout nets in the design.

Synthesis Exploration

This recipe analyzes the current synthesis results and determines the optimal synthesis setting combinations for the design.

18.6 Phase 2: Last-Mile Recipes

Once the Learning recipes have produced a good result that is very close to achieving your design goals, it is time for Phase 2.

If there are older results from other recipes, you can select a **parent revision** from it.

Recipe Availability

Not all recipes may be available across different FPGA vendor tools. Some recipes only exist for certain FPGA tools.

Clock Route Exploration

This recipe randomly assigns Global/Regional/Periphery clock routing resources to all or to user-specified clocks in the design. Using different clock routing can improve power and timing performance.

Extra Opt Exploration

This recipe iteratively runs placement, physical synthesis, and routing with different switches to guide the results towards the design goal. In a typical scenario, iteratively placing a design makes the tools work harder on optimizing it, improving the timing performance in the process.

Placement Exploration

This recipe finds and change the location of a register to stimulate placement variations. The effect is seemingly random like running placement seeds, which Vivado does not provide anymore.

Clock Margin Exploration

This recipe varies the clock uncertainty to trigger variations in the timing. By default, InTime will control the degree of clock margin, increasing or decreasing the value by 0.05ns each time - this value can be configured by the user via the `flow set strategy_clock_increment_value <Percentage value where 0.05 represents 5%>`.

Placement Seed Exploration

This recipe explores the effect of placement seeds on the design goal. This recipe changes the placement seed setting on the parent revision.

Effort Level Exploration

This recipe explores the effect of different effort levels on the design goal. This recipe changes the effort level setting on the parent revision.

Seeded Effort Level Exploration

This recipe performs exploration of seeds on best effort level results using the following steps:

Step 1: Explore placement effort levels on design (20 in total).

Step 2: Select the results in the round and set as parent.

Step 3: Run "Placement Seed Exploration" recipe on *each* of them.

If multiple rounds are specified, this recipe will execute step 2 and 3 on the 2nd best, 3rd best result and so on.

The expected project history after running this recipe with a custom parent revision can be seen in the project history shown in jobs 43, 44 and 45) for a flow configuration with `rounds = 2` and `runs_per_round = 3`.

History	Change	▼ 2: TNS	Area	Power	Runtime	▼ 1: Job ID
▶ eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:00:46	42
● eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:00:51	41
▶ eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:01:09	34
▶ calibrate_1	63.086	-118.647	8	85.94	00:02:42	36
▶ cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	38
▶ cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	43
▶ placement_effort_17	89.109	-92.624	8	84.5	00:04:07	45
● effort_result_2_seed_1	74.946	-106.787	8	85.91	00:04:49	
● effort_result_2_seed_2	51.389	-130.344	9	88.65	00:05:06	
● effort_result_2_seed_3	25.846	-155.887	8	88.55	00:05:14	
▶ placement_effort_15	92.957	-88.776	8	84.81	00:04:27	44
● effort_result_1_seed_3	79.769	-101.964	8	85.07	00:04:58	
● effort_result_1_seed_2	42.096	-139.637	8	86.29	00:04:44	
● effort_result_1_seed_1	6.381	-175.352	9	89.57	00:04:21	
● placement_effort_19	81.461	-100.272	8	85.08	00:03:08	
● placement_effort_7	75.544	-106.189	8	86.41	00:03:34	
● placement_effort_6	75.48	-106.253	8	86.85	00:03:59	
● placement_effort_9	75.386	-106.347	8	86.15	00:04:05	
● placement_effort_14	74.278	-107.455	8	88.42	00:04:20	
● placement_effort_1	71.835	-109.898	8	86.3	00:03:17	
● placement_effort_11	69.538	-112.195	8	84.44	00:04:05	
● placement_effort_18	55.798	-125.935	8	89.66	00:04:11	
● placement_effort_8	38.668	-143.065	8	86.95	00:03:57	
● placement_effort_20	32.946	-148.787	9	88.06	00:03:26	
● placement_effort_12	32.831	-148.902	9	87.74	00:04:07	
● placement_effort_3	20.923	-160.81	9	89.28	00:03:48	
● placement_effort_2	4.709	-177.024	9	90.47	00:03:40	
● placement_effort_4	4.337	-177.396	9	89.67	00:03:36	
● placement_effort_10	2.801	-178.932	9	89.01	00:04:28	
● placement_effort_13	-4.468	-186.201	10	92.88	00:04:01	
● placement_effort_5	-6.12	-187.853	9	90.37	00:03:50	
● placement_effort_16	-7.355	-189.088	9	90.66	00:03:52	

 **Tip**

When running this recipe, the `runs_per_round` property specifies the number of seeds that will be run on the top `rounds` effort levels found.

Region Exploration

This recipes examines the placement of the modules in the design and find more efficient regions for them, taking into account the timing and packing statistics. For example, the design may be squeezed into a flatter shape in order to be closer to critical resources.

18.7 General Recipes

There are general recipes which have different use-cases as described in the description of each recipe.

Just Compile My Design

This recipe simply builds the current active revision or design run in your project. Note that this happens on the run target specified by the `initial_compilation` property.

Compile with a Guide File

This recipe uses an existing Design Checkpoint file as a reference, and applies incremental compilation behaviour to re-run placement and routing for logic that has changed compared to the reference netlist. When this recipe is selected, checkboxes will appear next to strategies in your project build history. Check to select the strategy (pick only one) to use as a reference.

 **Note**

When running this recipe, make sure the Design Checkpoint (DCP) exists. InTime typically saves the generated DCP in the working folders, e.g. "plunify.jobs/"

Rerun Strategies

This recipe allows the user to re-run previously built strategies. A typical use-case is when the design changes after timing closure was achieved using a previous InTime strategy. Although the design has changed, *good* strategies can be re-run using this recipe.

When this recipe is selected, checkboxes will appear next to strategies in your project build history. Check to select the strategies to rerun. This is illustrated in

History	Change	▼ 2: TNS	Area	Power	Runtime	▼ 1: Job ID
<input type="checkbox"/> eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:00:51	41
▲ <input type="checkbox"/> eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:01:09	34
▲ <input type="checkbox"/> calibrate_1	63.086	-118.647	8	85.94	00:02:42	36
▲ <input type="checkbox"/> cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	38
▲ <input type="checkbox"/> cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	40
<input type="checkbox"/> placement_effort_15	92.957	-88.776	8	84.81	00:04:19	
<input checked="" type="checkbox"/> placement_effort_17	89.109	-92.624	8	84.5	00:04:53	
<input type="checkbox"/> placement_effort_19	81.461	-100.272	8	85.08	00:03:26	
<input checked="" type="checkbox"/> placement_effort_7	75.544	-106.189	8	86.41	00:03:38	
<input checked="" type="checkbox"/> placement_effort_6	75.48	-106.253	8	86.85	00:04:19	
<input type="checkbox"/> placement_effort_9	75.386	-106.347	8	86.15	00:04:03	
<input checked="" type="checkbox"/> placement_effort_14	74.278	-107.455	8	88.42	00:04:09	
<input type="checkbox"/> placement_effort_1	71.835	-109.898	8	86.3	00:03:19	
<input type="checkbox"/> placement_effort_11	69.538	-112.195	8	84.44	00:04:37	

The expected project history after running this recipe with the selection shown in the above figure is shown below (job 42).

History	Change	▼ 2: TNS	Area	Power	Runtime	▼ 1: Job ID
▲ <input type="checkbox"/> eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:00:46	42
<input type="checkbox"/> placement_effort_17_job_40	89.109	-92.624	8	84.5	00:02:23	
<input type="checkbox"/> placement_effort_7_job_40	75.544	-106.189	8	86.41	00:03:53	
<input type="checkbox"/> placement_effort_6_job_40	75.48	-106.253	8	86.85	00:03:35	
<input type="checkbox"/> placement_effort_14_job_40	74.278	-107.455	8	88.42	00:03:57	
<input type="checkbox"/> eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:00:51	41
▲ <input type="checkbox"/> eight_bit_uc_cyclone_iv		-181.733	8	85.99	00:01:09	34
▲ <input type="checkbox"/> calibrate_1	63.086	-118.647	8	85.94	00:02:42	36
▲ <input type="checkbox"/> cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	38
▲ <input type="checkbox"/> cal_speed_tns_low	75.48	-106.253	8	86.85	00:03:30	40
<input type="checkbox"/> placement_effort_15	92.957	-88.776	8	84.81	00:04:19	
<input checked="" type="checkbox"/> placement_effort_17	89.109	-92.624	8	84.5	00:04:53	
<input type="checkbox"/> placement_effort_19	81.461	-100.272	8	85.08	00:03:26	
<input checked="" type="checkbox"/> placement_effort_7	75.544	-106.189	8	86.41	00:03:38	
<input checked="" type="checkbox"/> placement_effort_6	75.48	-106.253	8	86.85	00:04:19	
<input type="checkbox"/> placement_effort_9	75.386	-106.347	8	86.15	00:04:03	
<input checked="" type="checkbox"/> placement_effort_14	74.278	-107.455	8	88.42	00:04:09	
<input type="checkbox"/> placement_effort_1	71.835	-109.898	8	86.3	00:03:19	

Rerun Best Results

This recipe automatically chooses the best results out of the current history (after filtering training data) and reruns them. The purpose is to run only the best strategies for a new or modified version of the design.

18.8 Advanced Recipes

Auto Pilot

This recipe is available from InTime version 3.0 onwards. Auto Pilot is a "manager recipe" that reads a pre-defined template file (in JSON format) describing a sequence of optimization steps. The user can customize a

specific sequence of recipes, e.g. "Hot Start", followed by "Default" and finally, "Placement Exploration", with specific criteria such as TNS or WNS attaining a particular value. For example, a user can run multiple rounds of Default recipe until $TNS < -100$ ns (the "criteria").

```
{
  "cookbook": [
    {
      "id": "1",
      "name": "InTime Default",
      "recipe_name": "intime_default",
      "flow": {
        "run_target": "local",
        "strategy_max_runtime": "12",
        "runs_per_round": "5",
        "rounds": "1",
        "concurrent_runs": "1",
        "goal": "speed_tns",
        "goal_based_target": "0",
        "control_stop_when_goal_met": "false"
      },
      "decisions": [
        {
          "next_recipe_id": "3",
          "criteria": "TNS < -79.72"
        },
        {
          "next_recipe_id": "2",
          "criteria": "WNS < -0.27"
        }
      ],
      "max_same_recipe_attempts": "99",
      "max_retry_if_fail": "10"
    },
    {
      "id": "2",
      "name": "Hot Start",
      "recipe_name": "hot_start",
      ...
    }
  ]
}
```

In the above example, "InTime Default" is the first recipe to execute. After execution, InTime examines every result and decides next steps according to the following logic. 1. If a result meets the overall goal of $TNS == 0$ ("goal": "speed_tns", "goal_based_target": "0"), Auto Pilot completes. 2. Otherwise, evaluate the two conditions in the "decisions" array. 3. If a result meets a specified "criteria", that result will become the parent for the corresponding next recipe (as specified in "next_recipe_id").

Note: - If the "decisions" array is empty, there will be no next recipe to execute. - If the "criteria" in the "decisions" array is an empty string, every result will become a parent for the corresponding next recipe.

Additional Auto Pilot Example

Here is another example.

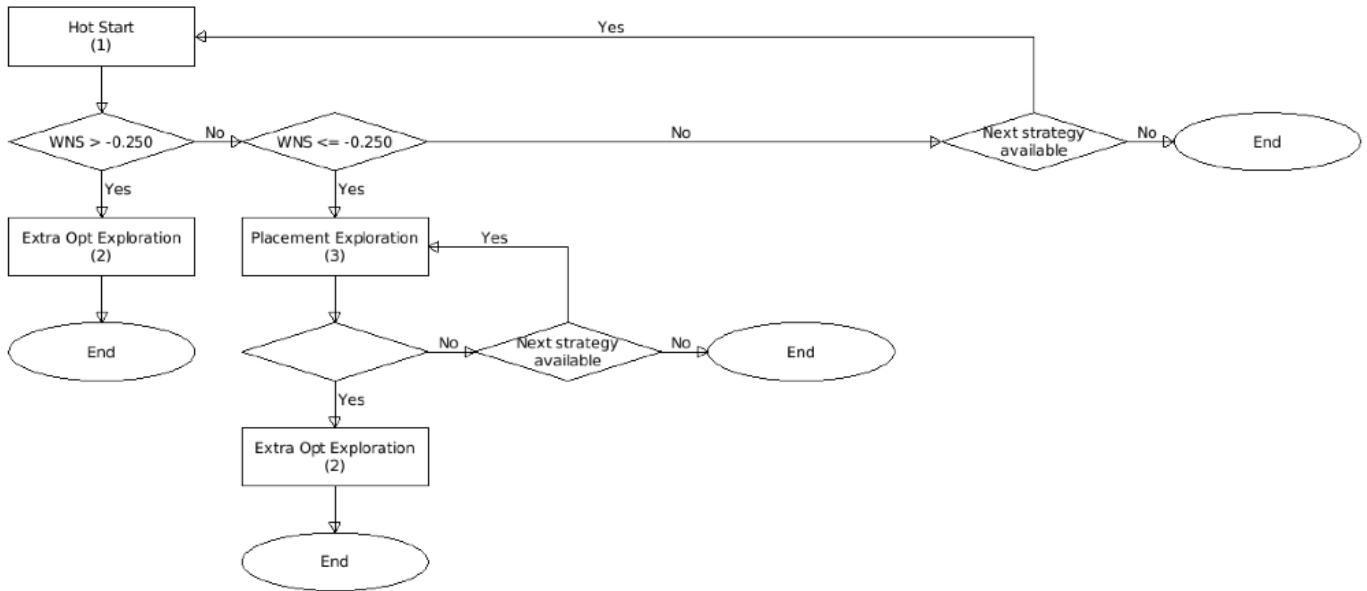
```
...
...
...
{
  "cookbook": [
    {
      "id": "1",
      "name": "Hot Start",
      "recipe_name": "hot_start",
      "flow": {
        "run_target": "private_cloud",
        "strategy_max_runtime": "24",
        "runs_per_round": "40",
        "rounds": "1",
        "concurrent_runs": "5",

```

```

        "goal": "speed_tns",
        "goal_based_target": "0",
        "control_stop_when_goal_met": "true"
    },
    "decisions": [
        {
            "next_recipe_id": "2",
            "criteria": "WNS > -0.250"
        },
        {
            "next_recipe_id": "3",
            "criteria": "WNS <= -0.250"
        }
    ],
    "max_same_recipe_attempts": "1",
    "max_retry_if_fail": "1"
},
{
    "id": "2",
    "name": "Extra Opt Exploration",
    "recipe_name": "extra_opt_exploration",
    "flow": {
        "run_target": "private_cloud",
        "strategy_max_runtime": "24",
        "runs_per_round": "15",
        "rounds": "1",
        "concurrent_runs": "5",
        "goal": "speed_tns",
        "goal_based_target": "0",
        "control_stop_when_goal_met": "true"
    },
    "decisions": [],
    "max_same_recipe_attempts": "2",
    "max_retry_if_fail": "2"
},
{
    "id": "3",
    "name": "Placement Exploration",
    "recipe_name": "vivado_placement_exploration",
    "flow": {
        "run_target": "private_cloud",
        "strategy_max_runtime": "24",
        "runs_per_round": "40",
        "rounds": "1",
        "concurrent_runs": "5",
        "goal": "speed_tns",
        "goal_based_target": "0",
        "control_stop_when_goal_met": "true"
    },
    "decisions": [
        {
            "next_recipe_id": "2",
            "criteria": "WNS > -0.250"
        }
    ],
    "max_same_recipe_attempts": "3",
    "max_retry_if_fail": "3"
}
],
"recipe_start_id": "1"
}
...
...
...

```



This Auto Pilot Template, shown in an InTime-generated flowchart, defines a flow where the "Hot Start" recipe executes first, followed by "Placement Exploration" and then "Extra Opt Exploration".

Hot Start 1. If the overall goal of $TNS == 0$ is met, stop. 2. If $WNS > -250ps$, run 'Extra Opt Exploration' 3. If $WNS \leq -250ps$, run 'Placement Exploration'

Placement Exploration 1. If the overall goal of $TNS == 0$ is met, stop. 2. If $WNS > -250ps$, run 'Extra Opt Exploration'

Extra Opt Exploration 1. If the overall goal of $TNS == 0$ is met, stop. 2. No further recipes will be run.

Run Auto Pilot in Tcl

Note

View detected Auto Pilot templates with the "flow auto_pilot_templates" command.

To run Auto Pilot in Tcl by specifying the desired template's alias (the "tcl_alias" field of a template):

```
flow set auto_pilot_alias <Template's Tcl alias e.g. timing>
flow load_recipe auto_pilot
flow run_recipe auto_pilot
```

To run Auto Pilot in Tcl by specifying the actual template file:

```
flow set auto_pilot_json <path to JSON file e.g. /home/user/.plunify/auto_pilot_templates/mytemplate.json>
flow load_recipe auto_pilot
flow run_recipe auto_pilot
```

Create A Template

Please refer to Create Auto Pilot Templates. Note that templates must be saved in `<user_home>/.plunify/auto_pilot_templates/`

**Note**

Sample template files are pre-installed within InTime. To customize one, make a backup copy first.

Custom Flow Recipe

This recipe runs the InTime flow once with the specified flow configuration. Unlike the other InTime recipes, no properties in the flow configuration are controlled by the recipe, giving full control to the user. When using custom strategy algorithms, this recipe should be used in order to gain control over the `strategy_algorithm` property which is normally locked and controlled by other InTime recipes.

To learn more about how to use this, refer to the Custom Strategies page.

19. Flow Properties

Flow properties control the InTime optimization flow. The following sections highlights the key properties. Not every property applies to all flows, for example, properties for Remote run targets are not applicable for Local. Similarly, not all flow properties are displayed in the GUI.

Property	Value
Run Tar...	Local
▼ Number Of Runs	
Runs ...	2
Roun...	1
Concu...	1
▼ Goals	
Recip...	Speed - TNS
Goal ...	0.00
Stop ...	<input checked="" type="checkbox"/>
▼ Parent Revision	
Initial ...	Local
Name	impl_1
Job Id	0
▼ Flow Control	
Stop I...	<input type="checkbox"/>
- Post...	-1,000.00
- Post...	-0.90
- Post...	-0.90
Force ...	<input type="checkbox"/>
Creat...	<input type="checkbox"/>
Reuse...	<input type="checkbox"/>
Allow ...	<input type="checkbox"/>

Refer to the Tcl Reference - Flow Properties for the full list of properties.

Using Tcl

When using InTime in Tcl command line mode, you can change flow properties via the `flow` series of commands. For example:

```
# Set the value of a property:
flow set run_target local
# Get the value of a property:
set run_target_value [flow get run_target]
# Show current flow configuration:
flow properties
```

19.1 General Properties

Before clicking the "Optimize" button, please specify the required build resource parameters, most importantly, the number of compilations, the number of rounds to run, and finally the number of servers or builds in parallel. These properties control the most important aspects of the flow.

Run Target (`run_target`): Specifies where a job is compiled. For details on the different run targets, see `run_targets`. Default: depends on the available license. When no license is registered the default is `plunify_cloud`, otherwise the default is `local`.

Value	Description
<i>Local</i> (<code>local</code>)	Run strategies on a single, standalone machine where InTime is also being run.
<i>Private Cloud</i> (<code>private_cloud</code>)	Run strategies in your internal server farm using the InTime <code>run-targets-private-cloud</code> .
<i>Plunify Cloud</i> (<code>plunify_cloud</code>)	Run strategies on a Plunify-managed cloud using the <code>run-targets-plunify-cloud</code> .

Tip

When selecting the *Private Cloud* run target, please make sure your Private Cloud is properly configured as described in the InTime Configuration Guide.

Runs Per Round (`runs_per_round`): The number of strategies to compile per iteration. You can set this number to 0 in which case InTime will compile only your original project (the "parent revision"). This lets you manage and build up a comprehensive history of all the builds performed on a design, even if you are not generating strategies via InTime. Note that InTime learns more effectively with a higher number of runs per round. Valid Range: `0-1000`.

Rounds (`rounds`): The number of iterations (each iteration consists of one or more strategies). Similar to Runs Per Round, the more rounds you run, the more effective InTime's learning capabilities become. Valid Range: `1-100`. The total number of runs will be `runs_per_round * rounds`.

Concurrent Runs (`concurrent_runs`): The number of strategies to compile in parallel. The context of concurrency and the default value depends on the selected run target:

Value	Description
<i>Local</i>	The number of parallel builds on a single machine. Default: <code>1</code> .
<i>Private Cloud</i>	The number of builds across multiple machines to assign to this job. Default: The concurrent run limit of the private cloud license.
<i>Plunify Cloud</i>	The number of Plunify Cloud servers to assign to this job. Default: <code>100</code> .

19.2 Goal Related Properties

Properties related to the goals of the InTime flow.

Recipe Goal (`goal`): Design goal to aim for. Default: `speed` .

Value	Description
<code>Speed - TNS</code> (<code>speed_tns</code>)	Achieve timing closure by attempting to minimize the design's <i>Total Negative Slack (TNS)</i> (also referred to as <i>Timing Score</i>).
<code>Area (area)</code>	Reduce device utilization.

Goal Based Target (`goal_based_target`): The target result to aim for. The value represents the following, depending on the selected `goal` :

Value	Description
<code>Speed - TNS</code> (<code>speed_tns</code>)	(Default: 0) TNS comprises total negative slack from setup, hold, recovery, removal, pulse width timing paths. Specify the value to aim for.
<code>Area (area)</code>	(Default: User-specified) The device's logic utilization percentage to aim for.

Stop When Goal Met (`control_stop_when_goal_met`): When true, stop as soon as one of the generated strategies meets the design goal. Otherwise, continue until the recipe completes. Default: `true` .

Enable All Timing Models (Intel Quartus-II) (`goal_quartusii_enable_allmodels`): When true, use all timing models and operating conditions for static timing analysis. Default: `true` .

Include Minimum Pulse Width Slack in Total Negative Slack calculation

(`goal_quartusii_enable_mpw_time_in_tns`): When true, include the Minimum Pulse Width slack when calculating the Total Negative Slack. Default: `true`

`goal_quartusii_enable_recovery_time_in_tns` - true

`goal_quartusii_enable_removal_time_in_tns` - true

`goal_quartuspp_enable_allmodels` - true

`goal_quartuspp_enable_mpw_time_in_tns` - true

`goal_quartuspp_enable_recovery_time_in_tns` - true

`goal_quartuspp_enable_removal_time_in_tns` - true

`goal_vivado_enable_pws_time_in_tns` - true

19.3 Parent Revision Properties

Properties related to the "parent revision" of each round within a job. Each round has a parent revision which is the point of reference for generating strategies and determining result improvements for recipes. The parent revision of the very first round is called the *base* or *root* revision (the root of a tree of results). while parent revisions of subsequent rounds are called *custom parent* revisions. Finally, when opening a project, InTime detects the active revision / run in the project and keeps track of it.

Initial Compilation (`initial_compilation`): The Run Target to use when InTime builds the root revision of the design. Default: `local` .

Value	Description
<code>Local</code> (<code>local</code>)	Build using the machine on which InTime is running.
<code>Skip</code> (<code>skip</code>)	If the root revision's results are not required for comparison, choose this option to reduce runtime. Some recipes, such the seed exploration ones, automatically skip building the root revision.

Name (`parent_revision_name`): The topmost revision in a round of builds / strategoes. Initially, this is the FPGA project's active revision, but subsequently, the user can change it to any revision in the project or in the InTime build history. Default: The active revision / run of the FPGA project.

Job Id (`parent_revision_job_id`): When 0, InTime looks up the `parent_revision_name` from the project and fails if it does not exist. On the other hand, when not 0, InTime attempts to find a job with the ID specified in the project's InTime build history. If found, InTime looks for a revision matching `parent_revision_name` within that job, and uses that strategy along with its results as the parent revision for the next round. Default: `0` .

The InTime GUI makes it easy to set any result in a project's history as the custom parent revision of the next iteration by right-clicking on the result in the project build history, and selecting "Set As Parent Revision". See `recipes_further_exploration` for more information on setting a custom parent revision.

19.4 Flow Control Properties

Properties which control flow decisions and outcomes, and may not be available depending on the FPGA tool.

Allow Eval IP (`control_allow_eval_ip`): Trial IP cores usually have different timing performance compared to licensed IP cores, and are typically not used for production builds. Enable this property to permit the use of trial IP cores. Default: `false` .

Create Bitstreams (`control_create_bitstreams`): Indicates if programming files should be generated for each strategy. Normally it does not make sense to do so since programming file generation adds to runtime. Default: `false` . For some toolchains, a side-effect of setting this to `false` is that power estimates will not be done.

Force Continue (`control_force_continue_when_no_results`): Normally InTime does not proceed to the next round of strategies if there are no results (failed or stopped strategies) in the current round. Toggling this property compels InTime to still proceed in such a situation. Default: `false` .

Ignore DRC Errors (`control_ignore_drc_errors`): Design Rule Checks (DRC) can be deemed excessive at times. Enable this property to disregard DRC failures and continue compiling the design. Default: `false` .

Ignore Errors (`control_ignore_errors`): Enable this property to disregard compilation error messages and continue to compile if possible. Default: `false` .

Regenerate IP Targets (`control_regen_ip_targets`): Certain IP cores can be compiled independently and saved as netlists. InTime archives your FPGA project and builds a copy for every InTime strategy. To reduce runtime, InTime assumes that every required IP netlist is archived properly. If you are encountering synthesis errors about missing modules or netlists, enable this property to re-compile all IP cores. Default: `false` .

Reuse Routed Netlist (`control_reuse_routed_netlist`): Indicates if the post-route parent revision circuit should be used to reduce build runtimes. Default: `false`.

Reuse Synthesis Results (`control_reuse_synthesis_results`): Indicates if synthesis results should be reused in order to decrease build runtimes. When enabled, only place & routing exploration is done, reusing synthesis results from the parent revision. Default: `false`. The following restrictions apply:

- Only supported for 'educated', 'oneshot' strategy algorithms.
- Only supported when 'initial_compilation' is 'local'.
- Not available for the 'plunify_cloud' run target.

Stop If Post-Place Timing Is Bad (`control_stop_when_post_place_timing_bad`): Post-placement timing can be a good indicator of final timing, so you can reduce your optimization turnaround time by enabling this option to terminate builds based on timing results just after placement. Default: `false`.

Value	Description
<i>Post-Place TNS Limit(ns)</i> (<code>post_place_tns_limit</code>)	Total Negative Slack value below which InTime will terminate any build. Default: <code>-1000</code>
<i>Post-Place Worst Setup Slack Limit(ns):</i> (<code>post_place_wns_limit</code>)	Worst Setup Slack value below which InTime will terminate any build. Default: <code>-0.9</code>
<i>Post-Place Worst Hold Slack Limit(ns):</i> (<code>post_place_whs_limit</code>)	Worst Hold Slack value below which InTime will terminate any build. Default: <code>-0.9</code>

When enabled, any of the Limit values meeting the threshold value results in InTime terminating the build. Please refer to "How to reduce run time with post placement estimates" for more information on how to use these options.

19.5 Strategy Related Properties

Properties related to the generation of strategies.

Algorithm (`strategy_algorithm`): The approach to take. Default: Controlled by the recipe.

Value	Description
<i>Educated</i> (<code>educated</code>)	This approach uses existing knowledge in the InTime database to generate strategies which are optimized for the design. The <code>training_data_filter</code> property controls which correlations to apply when making decisions during the generation of new strategies.
<i>Custom</i> (<code>custom</code>)	Uses strategies that you create. For information on implementing custom strategy generation algorithms please refer to <code>advanced-concepts-custom-strategy-algorithms</code> .
<i>Oneshot</i> (<code>oneshot</code>)	This approach uses the project's <i>whitelist</i> and <i>blacklist</i> as guides to generate strategies containing all possible combinations of the specified tool settings. The seed exploration recipes are examples of how this approach works.

Auto Adjust Clock Margin Value (`auto_clock_margin_adjustment`): Applicable only to the Clock Margin Exploration recipe, this property makes InTime generate clock margin values for strategies. Default: `True`.

Auto-Optimize Max Runtime (`auto_max_runtime`): Adjust Maximum Runtime automatically based on the runtimes of the previous job. Default: `False`.

Auto-Sync Results (`auto_sync_results`): Match your project path and name to existing results in your InTime database, and automatically link matching results to your project. Default: `True`.

Clock Margin Initial Value (`strategy_clock_initial_value`): Applicable only to the Clock Margin Exploration recipe, set this property (in ns) as the starting clock margin quantity to explore. Default: `0.05`.

Clock Margin Increment (`strategy_clock_increment_value`): Applicable only to the Clock Margin Exploration recipe, set this property (in ns) as the clock margin quantity to increase for each strategy. Default: `0.05`.

Custom Strategy (`strategy_custom`): The name of the strategy to use when `strategy_algorithm` is set to `custom`.

Implementation Name to Export (`strategy_export_impl_name`): Allows you to specify the implementation run name when you output an InTime strategy to your project.

Max Delay Constraints File (`strategy_max_delay_constraints_file`): A specific file containing `set_max_delay` constraints to use for the Max Delay Exploration recipe. Default: `""` (Uses detected constraints).

Max Delay Explore Constraints (`strategy_max_delay_explore_constraints`): Applicable only to the Max Delay Exploration recipe; tells the tool to use constraints instead of timing paths to adjust `set_max_delay` values. Saves time by not compiling the design. Default: `false`.

Max Delay Factors (`strategy_max_delay_factors`): Applicable only to the Max Delay Exploration recipe; allows the user to specify scale factors to adjust the `set_max_delay` values, in a Tcl list. Default: `{ 0.6 0.7 0.8 0.9 1.1 1.2 1.3 1.4 }`.

Max Runtime (`strategy_max_runtime`): The maximum allowed runtime (in hours) per strategy. Default: `12`, Valid Range: `0-48`.

Max Runtime Unit (`strategy_time_unit`): Choose how InTime monitors build runtime - in Seconds, Minutes or Hours in order to terminate builds that exceed a certain runtime. Default: `Hours`.

PBlock Constraints File (`strategy_pblock_constraints_file`): A specific file containing pblock constraints to use for the PBlock Exploration recipe. Default: `""` (Uses detected constraints).

Settings Scope (`strategy_settings_scope`): How strategy settings are applied to the parent revision. Default: `additive`.

Value	Description
<i>Additive</i> (<code>additive</code>)	Add settings defined for the strategy on top of existing settings of the parent revision. If a setting exists both in the strategy as well as the parent revision, the value defined for the strategy will be used.
<i>Restrictive</i> (<code>restrictive</code>)	Use only settings defined for the strategy, omitting all existing settings of the parent revision.

Strategy Clustering Multiplier (`strategy_cls_multiplier`): Clustering coefficient used to generate Hot Start strategies. This value ranges from 0.0 (no clustering) to 1.0 (as much clustering as possible). Default: `0.5`.

Strategy Prefix (`strategy_prefix`): Each generated strategy is assigned a unique name within a job's context. This property allows control over the name used to derive strategy names. For example, if the strategy prefix

is *calibrate*, strategy names will typically be *calibrate_1*, *calibrate_2* etc. Informative prefixes give a better idea of what a recipe does (refer to the recipes in InTime).

Strategy Retries If Fail (`strategy_retry_count`): Due to unexpected events like machine crashes or network outages, your InTime builds may fail. Specify the maximum number of attempts to re-build a strategy. Applies only to Private Cloud builds. Default: `3`.

Strategy Reuse Multiplier (`strategy_reuse_multiplier`): Influences how many past results are re-used when generating Hot Start strategies. This value ranges from 0.0 (no reuse) to 1.0 (as much reuse as possible). Default: `0.3`.

Strategy Start Interval (`strategy_delay_interval`): In an environment where tools licenses are limited, to load balance, you may not want all InTime builds to start simultaneously. Specify the number of seconds between the start of each strategy using this property. Default: `5` seconds.

Strategy Use Entire Results History (`strategy_use_all_training_data`): Controls the range of past results that Auto Pilot evaluates when deciding the next recipe. If `true`, Auto Pilot considers all the results up to the current point. If `false`, Auto Pilot considers only results from the latest job. Default: `true`.

Strategy XP Multiplier (`strategy_xp_multiplier`): Correlation coefficient used to generate Hot Start strategies. This value ranges from 0.0 (no correlation) to 1.0 (as much correlation as possible). Default: `0.5`.

Synthesis Name to Export (`strategy_export_synth_name`): Allows you to specify the synthesis run name when you output an InTime strategy to your project.

19.6 Cleaning Properties

Properties which control how InTime does housekeeping for files created during its flow.

The following items can be cleaned up per strategy:

Generated Files (`generated_files`): Files generated while creating, running and analyzing strategies. These include all files generated by the vendor tool as well as additional files created by InTime during result analysis. InTime puts all generated files in the `<project_dir>/plunify.jobs/<job_id>` directory. When the cleaning properties are not set to clean the generated files, the user can manually remove files. *Note*: InTime keeps specific files in order to learn from the results. Those files are not removed even if you set this property. **Project References** (`project_references`): Changes made to the project that are related to InTime strategies, including new project revisions etc.

The files to clean are set per strategy outcome. The following outcomes can be configured:

Met Goal (`met_goal`): Strategies which are built successfully and which meet the design goal. **Success** (`success`): Strategies which are built successfully but which do not meet the design goal. **Stopped** (`stopped`): Strategies which are stopped, either by the user or due to another strategy meeting the design goal (see `control_stop_when_goal_met` for more information). **Failed** (`failed`): Strategies which failed.

The *Generated Files* cleaning properties are controlled either through the flow properties in the InTime GUI or through the Tcl command line interface. The *Project References* cleaning properties are only controlled through the Tcl command line interface. For an overview of the current clean configuration, use the `flow get clean` command:

```
plunify> flow get clean
Clean operations per strategy outcome:

met_goal
-> clean generated_files = false
-> clean project_references = false
success
-> clean generated_files = true
-> clean project_references = true
stopped
-> clean generated_files = true
-> clean project_references = true
failed
-> clean generated_files = true
-> clean project_references = true
```

**Tip**

The above configuration is the default configuration. To restore this default configuration, use `flow set clean restore_defaults`.

To change the default configuration, use the following command and one of the specified sub-commands:

```
flow set clean <all,generated_files,project_references> <run_state> <true,false>
```

For example:

```
# To keep all generated files:
flow set clean generated_files all false

# To keep all generated files only for builds which fail or meet the design goal:
flow set clean generated_files failed true
flow set clean generated_files met_goal true

# To clean everything:
flow set clean all all true
```

Keep DCPs (`max_dcp_keep`): Design Checkpoint or netlist files preserve intermediate compilation information. Some are saved so that they can serve as custom parent revisions for subsequent jobs. In order to conserve disk space, you can set the number of Design Checkpoints to keep on hand. InTime prioritizes these netlists by order of Total Negative Slack, Worst Slack and then Area (logic utilization). Default: `999`.

20. Configure Training Data

As data and results accumulate in InTime, it may be necessary to filter the data so that only a subset of the database is used for Machine Learning.

20.1 Training Data Filter Properties

Each filter will show the current default value in brackets. E.g. Design ID (123456), means 123456 is the current default value.

Name	Property Name	Description
Design ID	Design	Filter data based on the current design's Design ID. Each design is given a unique ID.
Device	Device	Filter data based on the device type of the current project.
Device Family	DeviceFamily	Filter data based on the device <i>family</i> of the current project.
Device Speed:	DeviceSpeed	Filter data based on the device speed grade of the current project.
Toolchain	Toolchain	Filter data based on the current FPGA toolchain.
Toolchain Version	ToolchainVersion	Filter data based on the current FPGA toolchain version.
Local Job ID	Jobs	<p>Filter data based on the specified job IDs. Jobs can be specified using the following syntax.</p> <p>Examples:</p> <p>=1, 5, 7 : Specify individual jobs as a comma separated list preceded with = .</p> <p>!=1, 5, 7 : Exclude individual jobs by placing a ! in front of the job number, for example: !=1, 5, 7</p> <p>>5 : Specify job ranges. Supported operators include: < <= > <= .</p>

20.2 How to use - GUI

Click on the "Configure Training Data" button to switch to the GUI below.

The screenshot shows the InTime GUI with the 'Configure Training Data' panel active. The 'Training Data Filter' section has four filters applied: Design ID (1614244849616), Device (XC7K70T), Device Family (KINTEX7), and Toolchain (Vivado). The 'Summary' section shows 4 filters applied, 38 results after filter, 25 results usable for learning, and a time taken of 764ms. The 'History' table on the right shows a list of results with columns for Job ID, Job Hash, Design ID, and various performance metrics.

History	1: Local Job ID	Job Hash	Design ID	2: TNS	PP TNS	Worst Slack	Worst Setup
impl_1	457	f49969	1614244849616	-0.981	-1.283	-0.233	-0.233
idefault_xp_00_0_0_3		f49969	1614244849616	-0.18	-0.047	-0.085	-0.085
cal_speed_tns_low_2		f49969	1614244849616	-0.579	-0.976	-0.141	-0.141
impl_1	456	f2503f	1614244849616	-0.981	-1.283	-0.233	-0.233
idefault_xp_00_0_0_2		f2503f	1614244849616	0	-0.031	0.008	0.008
cal_speed_tns_low_1		f2503f	1614244849616	-0.579	-0.976	-0.141	-0.141
impl_1	454	be2c9f	1614244849616	-0.981	-1.283	-0.233	-0.233
impl_1	453	76738a	1614244849616	-0.981	-1.283	-0.233	-0.233
impl_1	449	572bae	1614244849616	-0.981	-1.283	-0.233	-0.233

In the GUI, what you see in the history panel is what is being used in InTime's Machine Learning training and prediction. To apply a filter, check the appropriate box or specify a value, then click "Apply". A summary of the number of results left after filtering, and the number of results that are suitable for training and learning will appear.

To start optimizing the design, click "Configure Training Data" again to go back to the Recipe view. Then select and run the recipe as usual.

20.3 How to use - Tcl Mode

In the Tcl Console, use the `training_data_filter` property. For example:

```
flow set training_data_filter Design&Device&ToolchainVersion&Jobs!=4
```

This filter will only allow results that have the same Design ID, same Device type, same toolchain version and excludes Job ID 4 from the training and learning data set.

OR

```
flow set training_data_filter Design&Device&Jobs>=5
```

This filter only allows results that have the same Design ID, same Device type and with a Job ID that is greater or equal to 5.

**Important**

Note that running the Tcl commands will not update the GUI. If you are unsure of the current property values, always use the `flow properties` Tcl command to display all the current values.

21. How to use project Setting Filters

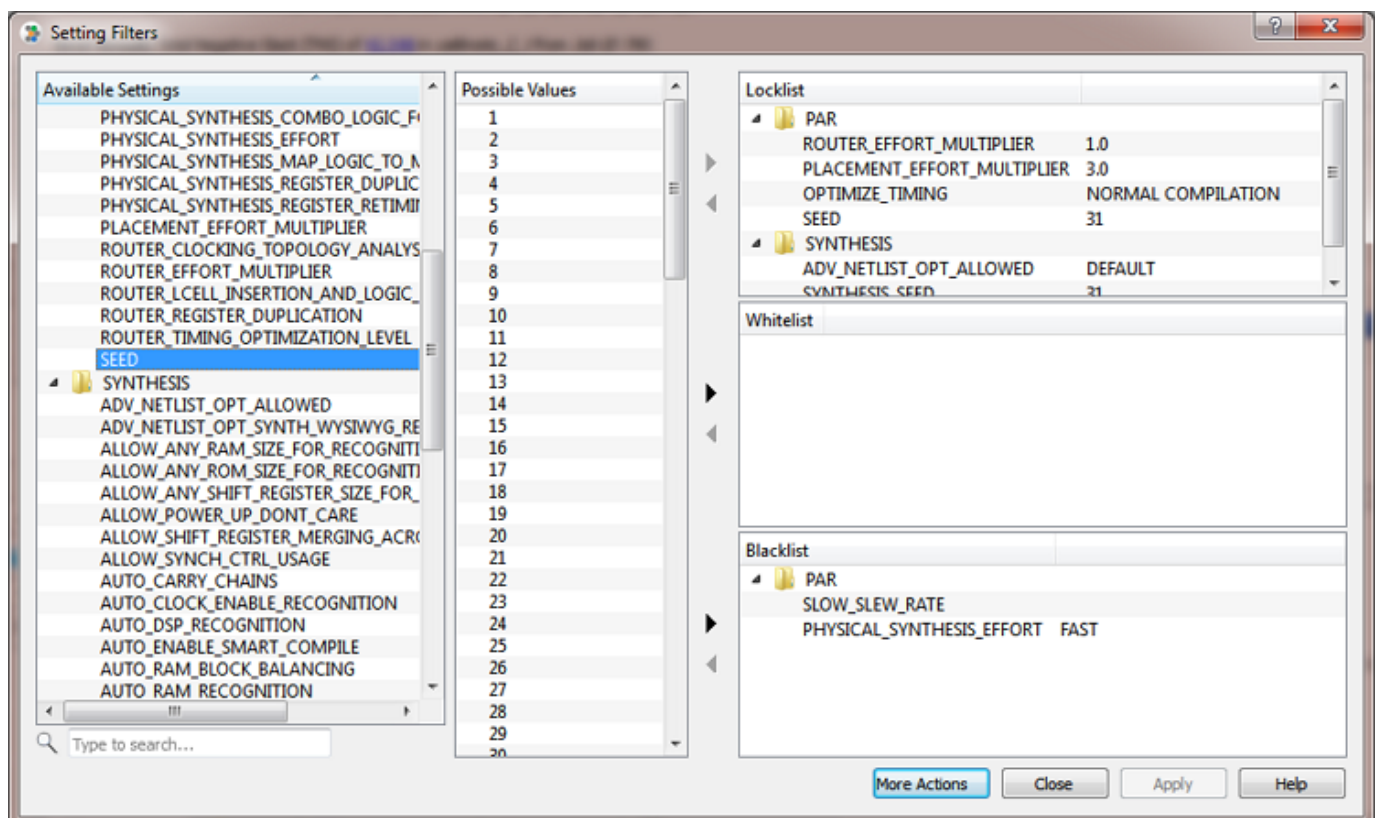
21.1 Overview

Project setting filters allows the user to have full control over the settings which are included in the InTime generated strategies. The following setting filters are available:

- **Whitelist:** Limits the settings in the generated strategies to the settings which are part of the whitelist.
- **Blacklist:** Excludes the settings in blacklist from the generated strategies.
- **Locklist:** Locks the settings in the locklist down to specific values. Items in the locklist must be specified using both a setting name and setting value. Values in a locklist is different from name and value pairs in the whitelist as the locklist always enforces the specified values on the generated strategy whereas the whitelist only limits the setting to the specified value *if the setting is used* by the strategy algorithm.

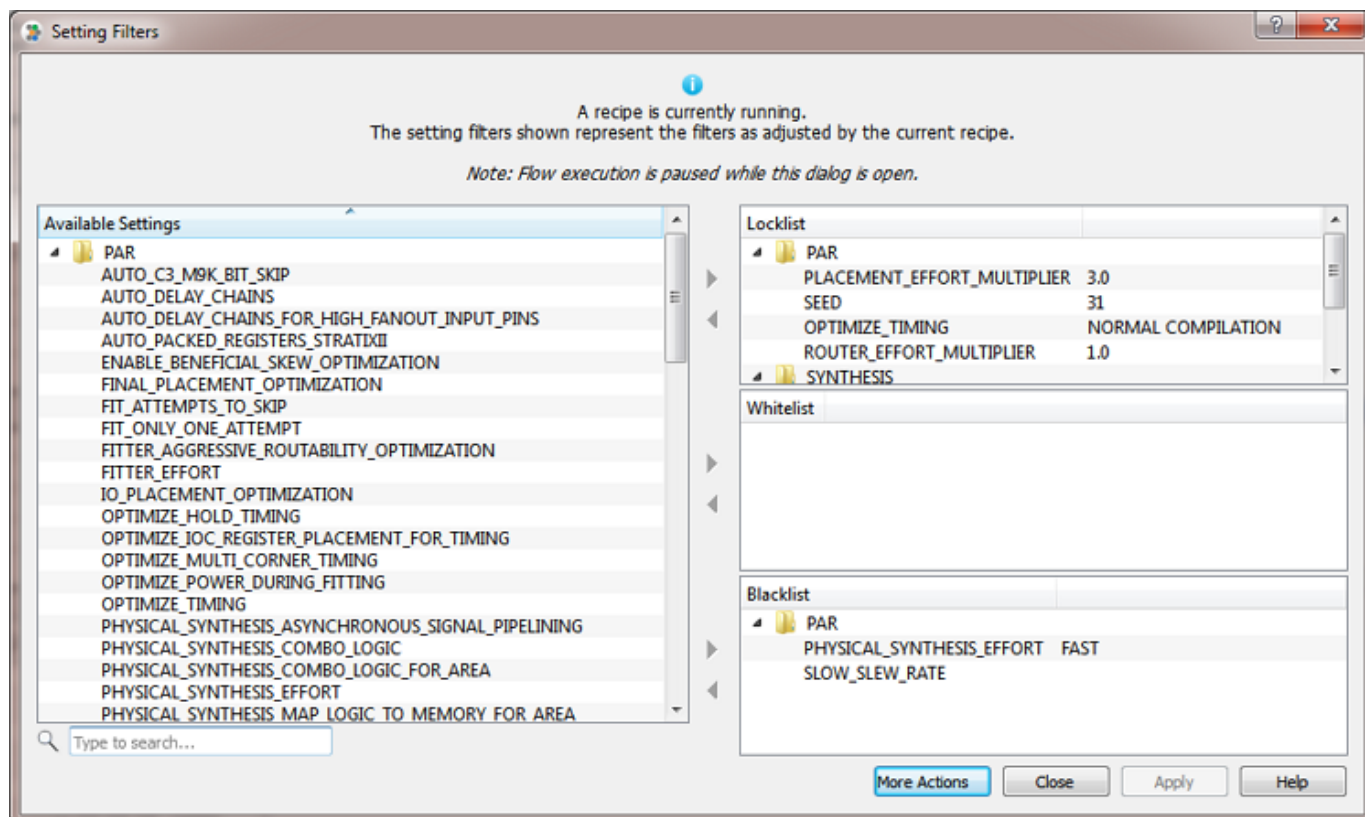
21.2 Using the Setting Filters GUI

Setting filters are managed through an easy to use GUI found under [Current Project] -> [Setting Filters] as shown below



In addition to allowing modification of the project's setting filters, this GUI also allows verification of setting filters and previewing the exploration space for a set of filters.

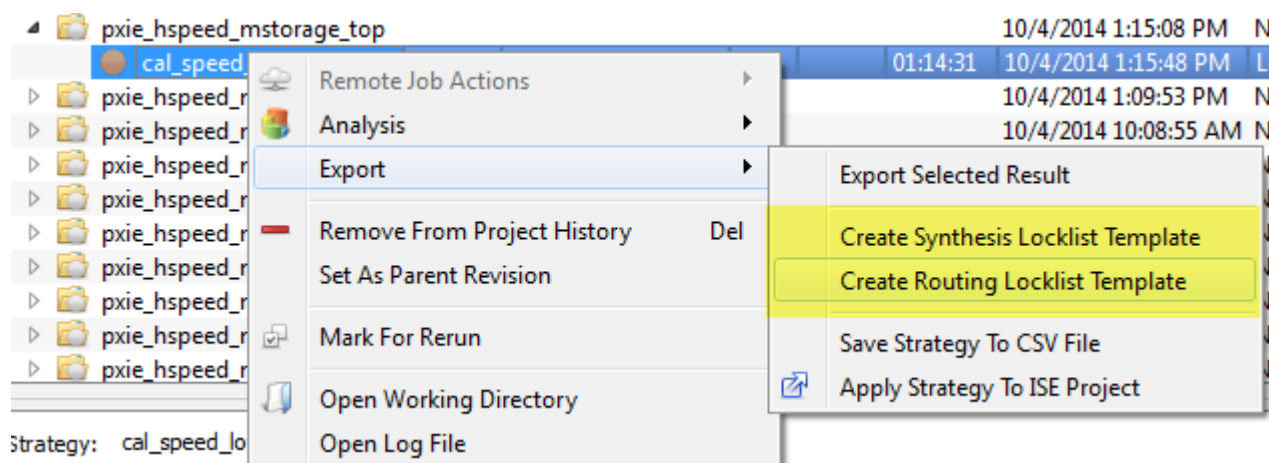
Note that many recipes in InTime adds or removes entries from the project's setting filters while running. When the setting filters GUI is opened while a recipe is running, the actual setting filters used for the running job can be inspected, as shown



The documentation of each recipe provides details of any changes the recipe makes to the project's setting filters while running (refer to the *Setting Filter Considerations* subsections). Note that any changes made to the project's setting filters by a recipe are reverted when the recipe completes. Use the `job summary <job id>` Tcl command to view the actual setting filters used for a specific job.

Saving a template

InTime supports saving and loading custom setting filter templates. Templates can either be exported directly from the setting filters GUI, or templates can be created from existing strategies using the right click context menu as shown



Once a setting filter has been created, it can be applied to the existing setting filters of a project through using the [More Action] -> [Apply Existing Template] action in the setting filters GUI.

21.3 Using Tcl

Using the Tcl interface, setting filters are specified using the `project setting_filters` command and its sub commands. To get an overview of all current setting filters for a project, use the `project setting_filters` command:

```
plunify> project setting_filters
Whitelist:
Empty

Blacklist:
Empty

Locklist:
Empty
```

Some of the common setting filters management commands are listed below.

```
# Clears all setting filters in the open project.
project setting_filters clear

# List all settings in the open project's specified setting filters.
# Type is either <blacklist>,<whitelist> or <locklist>.
project setting_filters <type>

# Adds the specified setting to the specified list, with <value> being
# optional (except for locklists).
project setting_filters <type> add <setting_name> <value>

# Clears the specified settings filter.
project setting_filters <type> clear <all,id_only,id_value_only>

# Checks if specified setting is contained in the specified list, with
# <value> being optional (except for locklists).
project setting_filters <type> contains <setting_name> <value>

# Removes the specified setting from the specified list, with <value> being
# optional (except for locklists).
project setting_filters <type> remove <setting_name> <value>

# Verifies the open project's setting filter combinations.
project setting_filters verify

# Lists all settings which can be used in the settings filter
# for the open project
project setting_filters available_settings
```

21.4 Examples

Educated algorithm usage example

The `educated` algorithm uses existing knowledge in the InTime database to explore a set of settings and values which are optimized for the design. To demonstrate the use of setting filters along with the `educated` algorithm, take a Quartus II project for which the following exploration needs to be done:

- `PLACEMENT_EFFORT_MULTIPLIER` should not be touched and the current project revision's value for it should be used.
- `ROUTER_REGISTER_DUPLICATION` is not allowed to be set to `ON` as it is causing issues with the design. All other values can be explored.
- `ROUTER_TIMING_OPTIMIZATION_LEVEL` must be locked down to `MAXIMUM` ignoring whatever value is assigned to it in the current project revision.
- All other settings in the current project revision must be respected and kept as part of the generated strategies.

This can easily be accomplished using the following setting filters and setting `strategy_settings_scope = additive` in the flow configuration.

```
Whitelist:
Empty

Blacklist:
"PLACEMENT_EFFORT_MULTIPLIER" "ROUTER_REGISTER_DUPLICATION:ON"

Locklist:
"ROUTER_TIMING_OPTIMIZATION_LEVEL:MAXIMUM"
```

Oneshot algorithm usage: Example 1

The `oneshot` algorithm explores each possible value for each allowed setting, one strategy at a time. To demonstrate, take a Quartus II project for which the following exploration needs to be done:

- Explore the following values for the `SEED` setting: `10`, `20`, `30`, `40`, `50`, `60`, `70`, `80`, `90`.
- All other settings in the current project revision must be respected and kept as part of the generated strategies.

This can easily be accomplished using the following setting filters and setting `strategy_settings_scope = additive` in the flow configuration.

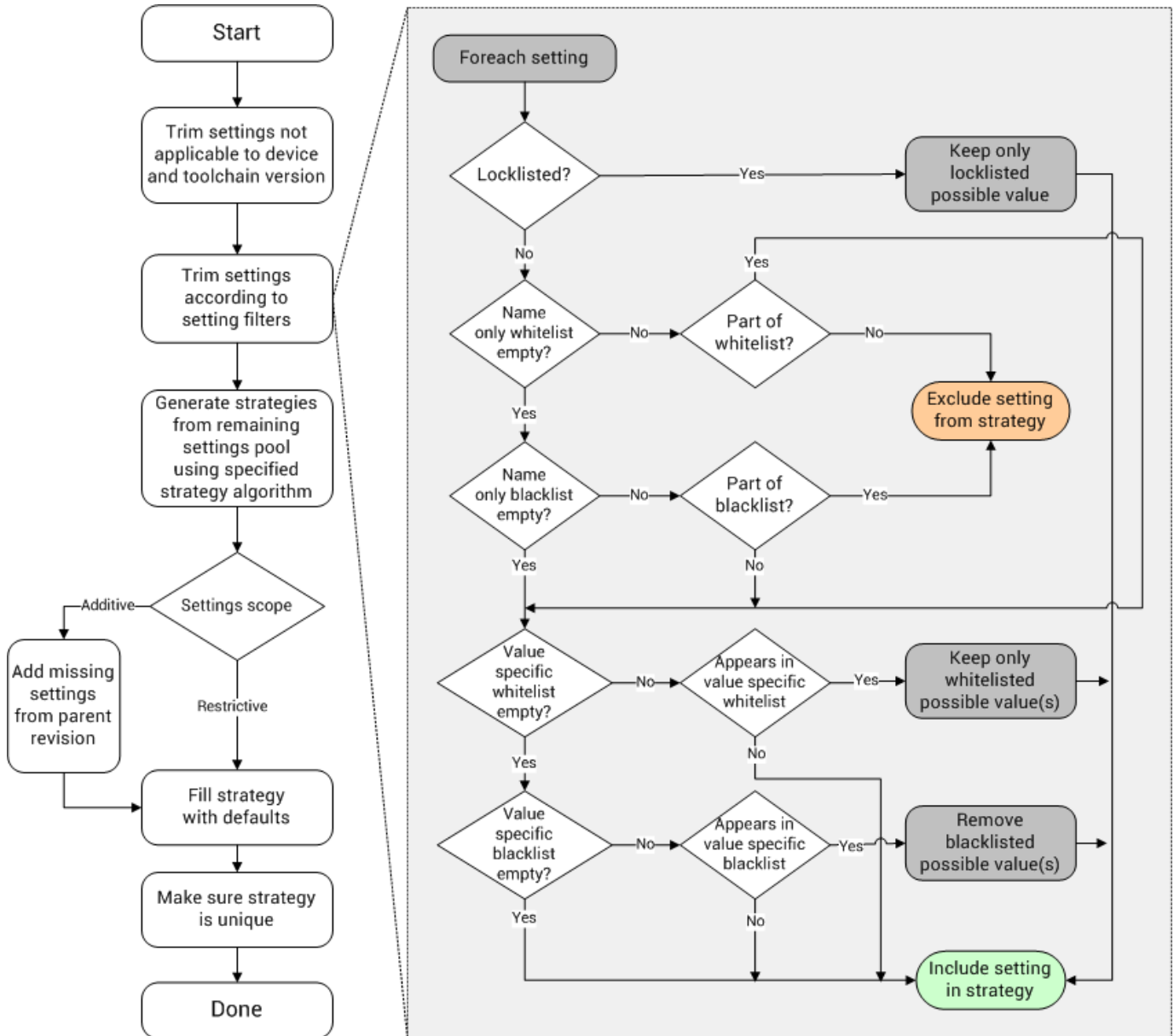
```
Whitelist:
"SEED" "SEED:10" "SEED:20" "SEED:30" "SEED:40" "SEED:50" "SEED:60"
"SEED:70" "SEED:80" "SEED:90"

Blacklist:
Empty

Locklist:
Empty
```

21.5 Understanding how Setting Filters work

Setting filters are powerful and gives the user exact control over which settings in the project InTime touches. The diagram shows the strategy generation process and how InTime trims the exploration space using the project's setting filters.



As shown in the above diagram, InTime prioritizes the settings filters giving the locklist the highest priority followed by the whitelist and then the blacklist. For example, if a setting and value combination appears in both the whitelist and blacklist, the combination from the whitelist will be included since the whitelist has priority over the blacklist.

Note that in addition to Setting Filters, the `strategy_settings_scope` flow configuration property should also be considered when determining which settings will be part of the final strategy. Also note that setting filters are saved on a per project basis in the `\<project_file>.intime` file in the project's directory.

 **Tip**

Any changes made to the project's setting filters by a recipe are reverted when the recipe completes. Use the `job summary <job id>` Tcl command to view the actual setting filters used for a specific job.

21.6 Recipes that do not support Setting Filters

Depending on the need to inherit the parent revision's or lock down certain settings, here is a list of recipes that *do not* support Setting Filters.

 **Tip**

Contact Plunify at tellus@plunify.com if there is a need to support Setting Filters.

Recipe Name	Tcl Alias	Vendor
Auto Floorplan	auto_floorplan	AMD, Altera, Microchip
Auto Pilot*	auto_pilot	AMD, Altera, Microchip
Auto Placement	auto_placement	Altera
Clock Margin Exploration	clock_margin_exploration	AMD
Compile With a Guide File	vivado_incremental_compilation	AMD
Effort Level Exploration	effort_level_placement	Altera
Extra Opt Exploration	extra_opt_exploration	AMD, Altera
Max Delay Exploration	max_delay_exploration	AMD, Altera, Microchip
Placement and Router Effort Level Exploration	effort_level_placement_router	Altera
Placement Exploration	placement_exploration	AMD, Microchip
Placement Seed Exploration	placement_seed_exploration	Altera, Microchip
Seeded Effort Level Exploration	seeded_effort_level_exploration	Altera


 **Note**

By default, Auto Pilot clears all Setting Filters before each recipe, so if the user wishes to set any specific Setting Filter, that must be done in the Auto Pilot Template instead.

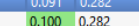
22. Managing InTime Results

22.1 Reviewing Results in GUI

The project history keeps track of all InTime runs on a **per project** basis. InTime updates this history while a recipe is running to give continuous updates on which strategies are run as well as the outcomes. Each round is given a job ID and denoted with a folder icon. If there are multiple rounds, each round is organized in a tree format. To expand a round, simply click on the arrow icon next to the folder icon to reveal the next round.



History	Change	2: TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width	Area	Power	Fmax	Runtime	Start Time	Run Target	1: Job ID	Remote Job ID	Tag
▼ impl_1		-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:05:27	2019-07-17 13:59:...	Local	13		
> idefault_1	1.652	-0.272	-1.329	-0.064	-0.064	-0.254	0.100	0.282	0.11	0.266	462.11	00:18:53	2019-07-17 14:13:40	Local	14		InTime Def
● idefault_3	1.567	-0.357	-0.469	-0.161	-0.161	-0.177	0.143	0.282	0.09	0.301	442.28	00:13:41	2019-07-23 11:39:28	Local			InTime Def
● cal_speed_tns_low_1	1.147	-0.777	-0.632	-0.166	-0.166	-0.158	0.146	0.282	0.09	0.299	441.31	00:13:40	2019-07-17 14:13:24	Local			InTime Def
● idefault_4	1.073	-0.851	-0.59	-0.204	-0.204	-0.182	0.100	0.282	0.09	0.303	434.03	01:11:07	2019-07-23 11:39:47	Local			InTime Def
● idefault_7	0.947	-0.977	-1.117	-0.199	-0.199	-0.296	0.058	0.282	0.12	0.275	434.97	00:41:44	2019-07-23 12:52:36	Local			InTime Def
● idefault_5	0.38	-1.544	-1.526	-0.278	-0.278	-0.307	0.106	0.282	0.09	0.299	420.52	00:11:46	2019-07-23 12:48:51	Local			InTime Def
> impl_1	-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:05:51	2019-07-03 14:47:19	Local	4			
> impl_1	-1.924	-1.76	-0.362	-0.362	-0.297	0.091	0.282	0.09	0.298	406.17	00:04:35	2019-07-03 10:16:17	Local	2			



How to control sorting and column order

Clicking on the column name will sort the values in that column. Using the **ctrl** button, you can sort multiple columns at the same time. You can also drag and drop the columns to change the order in which they appear.

View Strategy Details

To view more details about any strategy in the project history, select the strategy (or double-click) and click on the *Selected Results* tab at the bottom of the GUI. The details of the selected strategy will be shown in this tab as shown below. There are 2 modes of display, "Results" view & "Settings" view.

Results View

In the *Results* view, besides the timing information, InTime also tracks information such as "Failing Paths", "Run Time Summary", "Power Summary", "Flow Summary" and machine details including CPU type, RAM. For Vivado, the implementation checksums are also saved.

History	Change	TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width	Area	Power	Fmax	Runtime
impl_1		-1.258	-1.474	-0.213	-0.213	-0.252	0.091	0.282	0.8	0.132	432.34	00:03:55
hotstart_1	0.339	-0.919	-1.365	-0.172	-0.172	-0.242	0.079	0.282	0.81	0.133	440.14	00:12:10
hotstart_2	-0.344	-1.602	-1.544	-0.256	-0.256	-0.24	0.115	0.282	0.76	0.134	424.45	00:07:48
hotstart_3	0.127	-1.131	-1.325	-0.234	-0.234	-0.275	0.140	0.282	0.75	0.131	428.45	00:16:49
hotstart_4	0.649	-0.609	-1.086	-0.1	-0.100	-0.195	0.081	0.282	0.84	0.133	454.55	00:08:58
hotstart_5	0.648	-0.61	-1.33	-0.131	-0.131	-0.241	0.083	0.282	0.8	0.133	448.63	00:09:40
hotstart_6	0.388	-0.87	-1.524	-0.129	-0.129	-0.271	0.085	0.282	0.78	0.135	448.63	00:10:07
hotstart_7	0	-1.258	-1.474	-0.213	-0.213	-0.252	0.091	0.282	0.8	0.132	432.34	00:03:56

Strategy: hotstart_5 (Job Id: 40) Results Settings

Overview	
Goal	Speed - TNS
Improvement	0.648
Sum of the failing slack across all timing paths	-0.61
Worst Slack out of all slack types in the design	-0.131
Logic utilization	0.8
Power dissipation	0.133
Strategy compilation time	00:09:40

Session Log Issues Selected Results Td Console

Understanding Vivado Implementation Checksums

Implementation checksums are necessary for comparing 2 builds. Every result generated in InTime must and can be replicated in Vivado. By monitoring the checksums, one can tell at what point does the build diverge. For example, if the first checksum is different, it means that the synthesis output is different.

Settings View

In the **Settings** view, the default settings are listed on the right and the settings for the selected strategy is listed on the left.

History	Change	TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width	Area	Power	Fmax	Runtime
impl_1		-1.258	-1.474	-0.213	-0.213	-0.252	0.091	0.282	0.8	0.132	432.34	00:03:55
hotstart_1	0.339	-0.919	-1.365	-0.172	-0.172	-0.242	0.079	0.282	0.81	0.133	440.14	00:12:10
hotstart_2	-0.344	-1.602	-1.544	-0.256	-0.256	-0.24	0.115	0.282	0.76	0.134	424.45	00:07:48
hotstart_3	0.127	-1.131	-1.325	-0.234	-0.234	-0.275	0.140	0.282	0.75	0.131	428.45	00:16:49
hotstart_4	0.649	-0.609	-1.086	-0.1	-0.100	-0.195	0.081	0.282	0.84	0.133	454.55	00:08:58
hotstart_5	0.648	-0.61	-1.33	-0.131	-0.131	-0.241	0.083	0.282	0.8	0.133	448....	00:09:40
hotstart_6	0.388	-0.87	-1.524	-0.129	-0.129	-0.271	0.085	0.282	0.78	0.135	448.63	00:10:07
hotstart_7	0	-1.258	-1.474	-0.213	-0.213	-0.252	0.091	0.282	0.8	0.132	432.34	00:03:56

Strategy: hotstart_5 (Job Id: 40) Results **Settings**

SET_POWER_OPT_CELL_TYPES	none	none
PLACE_DESIGN		
CLOCK_MARGIN	DISABLE	DISABLE
DIRECTIVE	SSI_BalanceSLLs	Default
INCREMENTAL_COMPILE	DISABLE	DISABLE
NO_BUFG_OPT	FALSE	FALSE
NO_FANOUT_OPT	FALSE	FALSE
PBLOCK	DISABLE	DISABLE
SLR_ASSIGNMENT	DISABLE	DISABLE
POST_PLACE_POWER_OPT_DESIGN		
IS_ENABLED	0	0
PHYS_OPT_DESIGN		

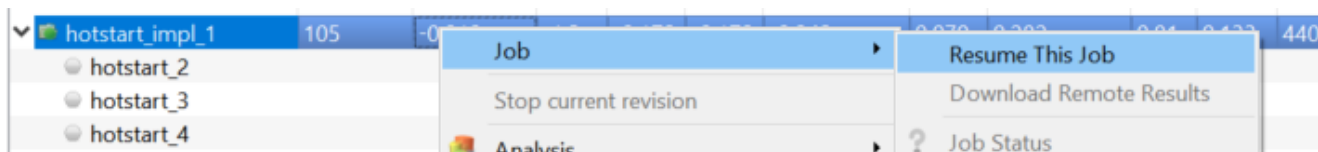
Session Log Issues **Selected Results** Td Console

Download Results

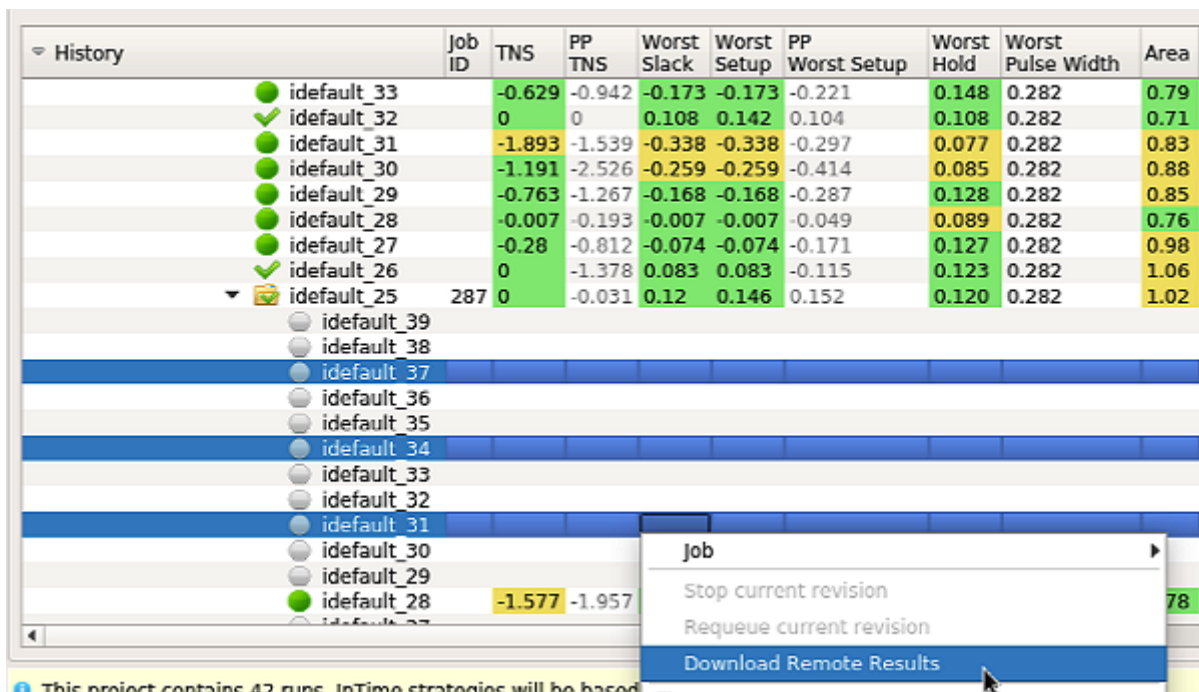
Result can be downloaded individually or all for Private Cloud and Plunify Cloud job. Right-click on your job and select "Resume This Job" to download all the results of that job. Alternatively user can selectively

download a few results by selecting on the strategies with "Ctrl" key pressed and right click "Download Remote Results".

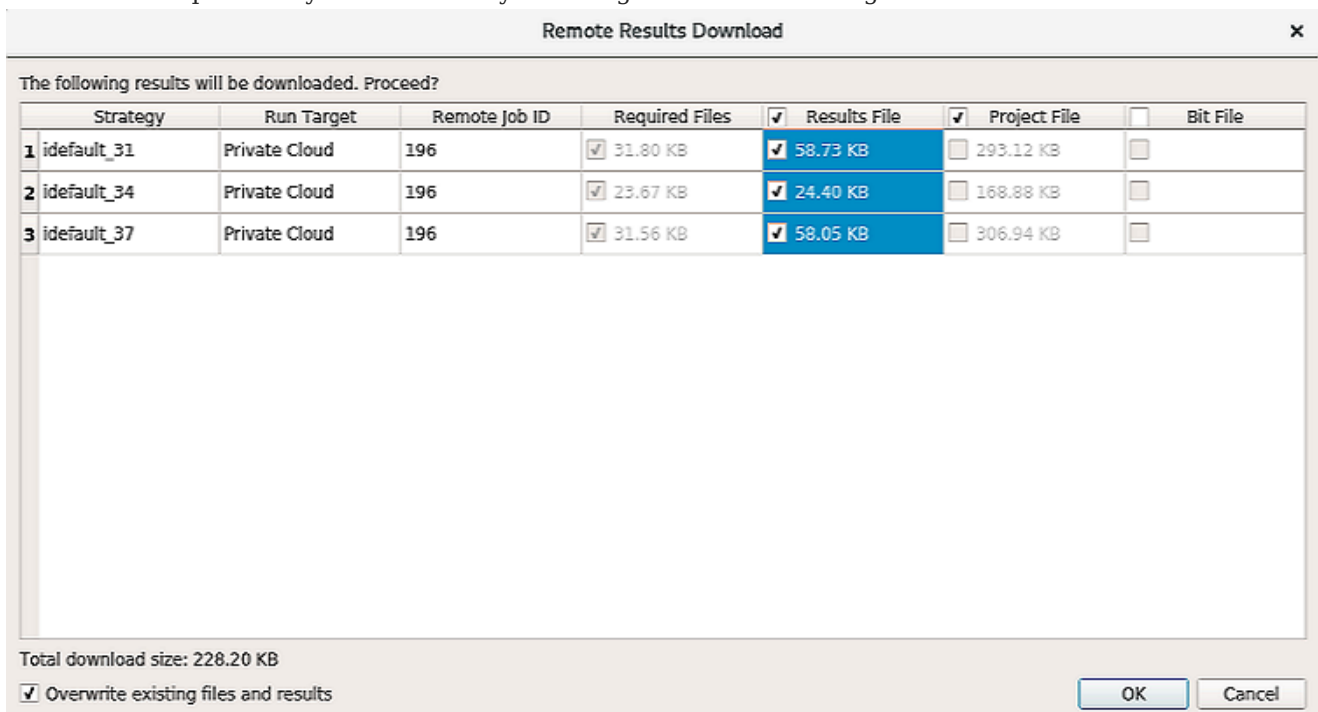
- Download all results by selecting the job, right-click and select "Resume This Job".



- Download selective results, select on the strategies with "Ctrl" key pressed and right click "Download Remote Results".



User is able to choose what type of files to download. For report files, check "Results File". For DCP files, check "Project File" checkbox. For bitstream files, check "Bit File" checkbox. User is able to overwrite files that were previously downloaded by checking "Overwrite existing files and results" checkbox.



Keep Results / Report Files

Due to file sizes and practical limitations like disk space, InTime retains only a subset of all the files generated by the FPGA tools. If a particular report or file is required, use the following Tcl command to whitelist and specify the type(s) of files to retain.

For example,

`flow set clean_keep_whitelist { .rpt } will retain all the files with the 'rpt' extension.`

When results are available, download the whitelisted files by checking the "Project Files" option in the Remote Results Download dialog box. The whitelisted files are compressed into a file named "*.whitelist.zip" and downloaded together with the rest of the project files.

To clear the whitelist, use the `flow clear clean_keep whitelist` command.

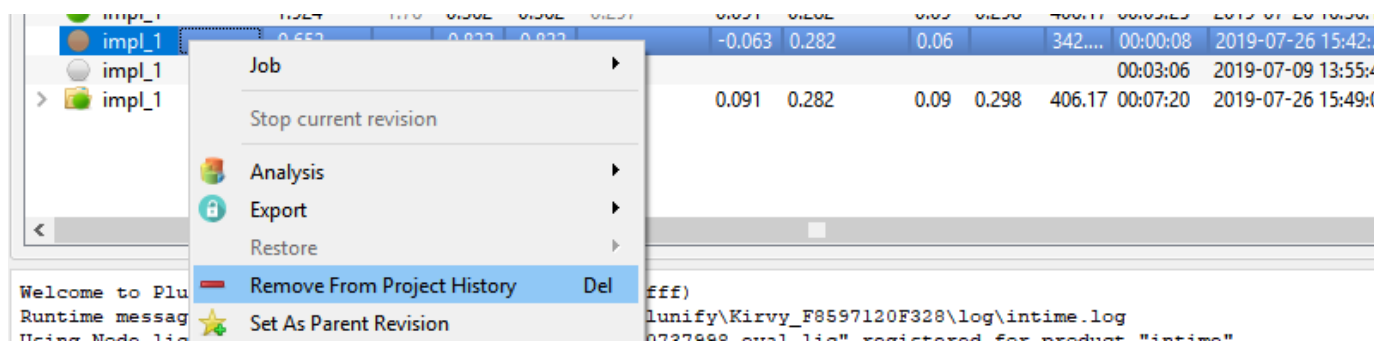
To read more about the relevant Tcl commands, please refer to the flow set property values below.

 Note

This feature is only available for Private Cloud and Plunify Cloud, requires a full license.

Delete Jobs or Strategies

Individual strategies and jobs can be removed individually by right clicking on the result and selecting the appropriate actions.



A prompt will appear to ask you about the type of deletion.

Remove Results From History



All selected results and all of the results underneath them will be removed. Are you sure you want to remove these results?

If so, please choose if the results should only be removed from the project history or everywhere (history, vendor project references, associated files).

Remove From History Only

Remove Everywhere

Cancel

1. **Remove Everywhere** - Delete these results from the database and delete the corresponding files from <project folder>/plunify.jobs/.
2. **Remove From History Only** - Just delete these results from the database

If you select a job folder, **all** the strategies in that folder will be deleted. If you select a strategy, only that strategy will be deleted.

Compare Strategies

To compare two strategies, select them in the project history panel and click on **Selected Results** at the bottom of the screen. A detailed comparison between the two strategies is provided as shown below

Select Two Strategies

calibrate_1 (Job 28)		cal_speed_tns_low (Job 28)	
RESULTS			
124.135	SPEED_TNS	137.767	
8	AREA	8	
90.46	POWER	85.61	
00:01:40	RUNTIME	00:02:04	
SYNTHESIS			
DEFAULT	ADV_NETLIST_OPT_ALLOWED	DEFAULT	
ON	ADV_NETLIST_OPT_SYNTH_WYSIWYG_REMAP	ON	
ON	ALLOW_ANY_RAM_SIZE_FOR_RECOGNITION	ON	
ON	ALLOW_ANY_ROM_SIZE_FOR_RECOGNITION	ON	
ON	ALLOW_ANY_SHIFT_REGISTER_SIZE_FOR_RECOGNITION	ON	
ON	ALLOW_POWER_UP_DONT_CARE	ON	
OFF	ALLOW_SHIFT_REGISTER_MERGING_ACROSS_HIERARCHIES	OFF	
ON	ALLOW_SYNCH_CTRL_USAGE	ON	
ON	AUTO_CARRY_CHAINS	ON	
ON	AUTO_CLOCK_ENABLE_RECOGNITION	ON	
ON	AUTO_DSP_RECOGNITION	ON	

Select "Selected Results"

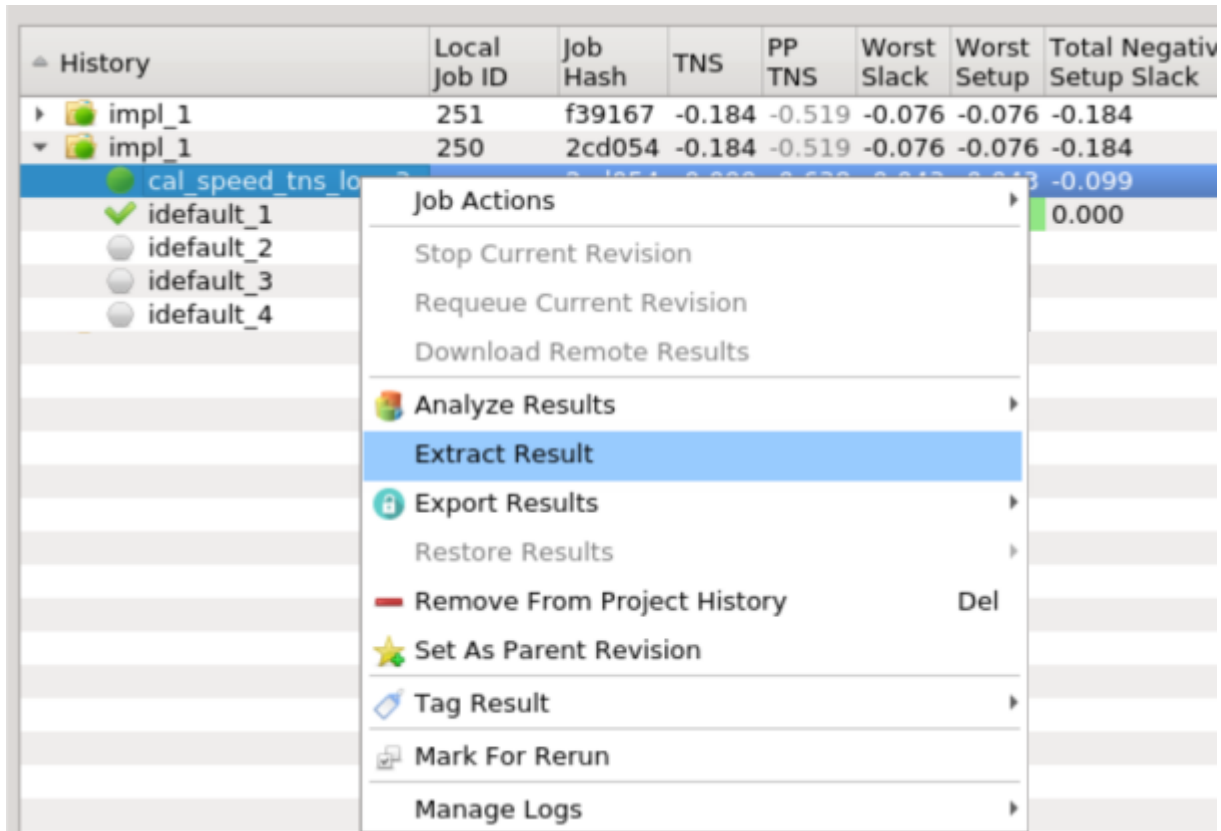
Comparison

Extract Results (Vivado Only)

InTime will automatically extract the results and files required for the next step. However, in the case where these files are deleted or not present, the results and files can be extracted again. Note that this only works if the DCP of the project is present. To extract the results and files:

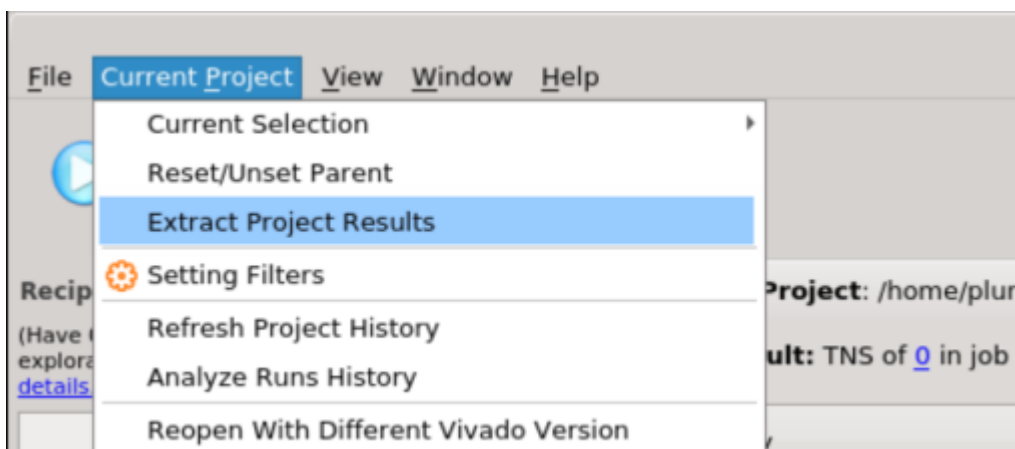
Existing Result

Right click and choose "Extract Results" as shown below.



New Project

If this is a new project, go to "Current Project" and choose "Extract Project Results" as shown below.



Export Strategies to Project

Please refer to Export Results to FPGA.

23. Export InTime Results

After obtaining results in InTime, there are various ways to export the results to your FPGA project, a script and other formats.

23.1 Files generated by InTime

InTime will create a folders for individual job under the project folder. These folders will be named `plunify.job/<jobid>`. Under these folders, InTime will save report and logs. Besides logs, if you are using a full license, bit files can be generated if the property for "Create Bitstreams" property is enabled.

Tip

Use the `flow set control_create_bitstreams true` to enable the property.

For Vivado, DCP files will also be generated and can be used directly to create the bitstream.

23.2 Export Strategies from InTime

Depending on the FPGA toolchain and project type, there are a few options for exporting the result

The screenshot shows the InTime GUI with a table of job results. The table has columns: History, Remote Job ID, 1: Local Job ID, Job Hash, 2: TNS, PP TNS, Worst Slack, Worst Setup, Total Negative Setup Slack, and PP Worst Setup. The 'History' column shows a tree view with 'impl_1' and 'placement_1' expanded. A context menu is open over the 'placement_1' row, showing options like 'Job', 'Stop current revision', 'Requeue current revision', 'Download Remote Results', 'Analysis', 'Export', 'Restore', 'Remove From Project History', 'Set As Parent Revision', 'Unset Parent Revision', 'Tag Result', 'Mark For Rerun', and 'Manage Logs'. The 'Export' option is highlighted, and a sub-menu is open showing options like 'Export Selected Result', 'Export Results in JUnit (XML)', 'Create Synthesis Locklist Template...', 'Create PAR Locklist Template...', 'Create Locklist Template...', 'Save Strategy To CSV File...', 'Save Strategy To Tcl Script...', 'Create New Project Runs From Strategy...', and 'Create Bitstream From Strategy...'. The last four options are highlighted with an orange border.

History	Remote Job ID	1: Local Job ID	Job Hash	2: TNS	PP TNS	Worst Slack	Worst Setup	Total Negative Setup Slack	PP Worst Setup
impl_1	230	145	08d84b	-0.981	-1.283	-0.233	-0.233	-0.981	-0.305
placement_1			08d84b	-0.635	-1.006	-0.134	-0.134	-0.635	-0.186
impl_1					-1.283	-0.233	-0.233	-0.981	-0.305
impl_1					-1.283	-0.233	-0.233	-0.981	-0.305
					-1.283	-0.233	-0.233	-0.981	-0.305
					-1.283	-0.233	-0.233	-0.981	-0.305
					-1.283	-0.233	-0.233	-0.981	-0.305

*The GUI shows just some possible values, not all.

To export to a CSV file using Tcl commands, e.g.

```
plunify> results export -results_csv
```

Refer to Tcl Reference for more details.

CSV File

The csv file will contain all the key results like TNS, WNS and also all the settings used for the strategy

Tcl Script

The Tcl script will contain a script that you can run in the FPGA tools to regenerate the exact same result as you see in InTime. All required constraint files will generated together with the Tcl and named similarly. When in GUI mode, InTime prompts you for the destination path and filename of the Tcl script.

Note

Besides using the exported Tcl script for a Vivado DCP project, you can also use the routed DCP files from the `plunify.job/<jobid>` folder.

In the Tcl console, using the example in the screenshot (Job ID is 145 and strategy name is placement_1),

```
strategy set_active placement_1 145
strategy export apply_placement_1.tcl -script_tcl
```

JUnit Test

To generate a JUnit type of report for the results, right click on the parent revision of a job. A sample report is as shown.

```
-<testsuites>
-<testsuite recipe_name="" parent_revision_name="impl 1" jobid="170">
  <testcase strategy_name="hotstart_1" runtime="00:01:43" wns="-0.195" ppwns="-0.198" status="RunDone" tns="-1.167" pptns="-1.23"/>
  <testcase strategy_name="hotstart_2" runtime="00:01:16" wns="-0.195" ppwns="-0.198" status="RunDone" tns="-1.167" pptns="-1.23"/>
  <testcase strategy_name="hotstart_3" runtime="00:01:16" wns="-0.195" ppwns="-0.198" status="RunDone" tns="-1.167" pptns="-1.23"/>
  <testcase strategy_name="hotstart_4" runtime="00:01:16" wns="-0.195" ppwns="-0.198" status="RunDone" tns="-1.167" pptns="-1.23"/>
  <testcase strategy_name="hotstart_5" runtime="00:01:21" wns="-0.198" ppwns="-0.198" status="RunDone" tns="-1.329" pptns="-1.23"/>
  <testcase strategy_name="hotstart_6" runtime="00:01:12" wns="-1" ppwns="" status="RunStopped" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_7" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_8" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_9" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_10" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_11" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_12" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_13" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_14" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_15" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_16" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_17" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_18" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_19" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_20" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
  <testcase strategy_name="hotstart_21" runtime="" wns="-1" ppwns="" status="RunNotStarted" tns="-1" pptns=""/>
</testsuite>
</testsuites>
```

You can also use a Tcl command to export this

```
plunify> results add last_job
plunify> results export sample_report.xml -junit_xml
```

External Database File

To manually migrate data between different projects, export results to an InTime Database file or to the InTime Server. See [Sharing Results](#) for details.

Critical Path HTML

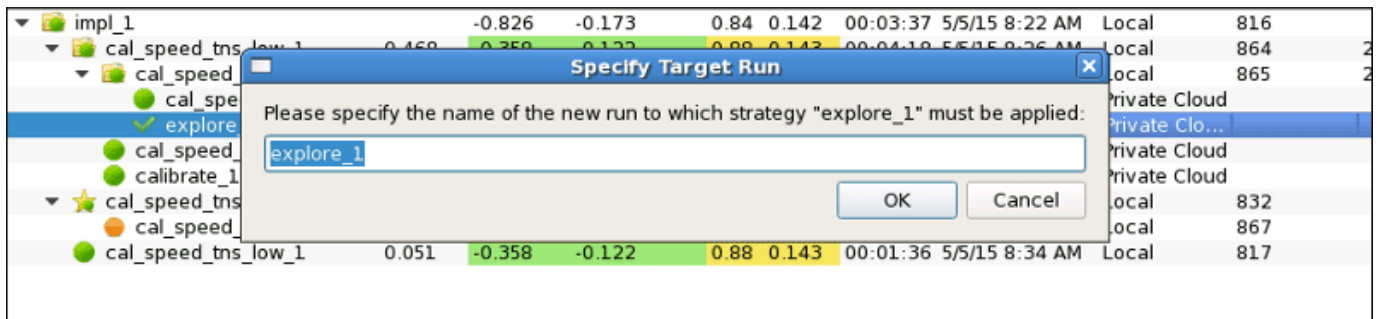
This option exports the HTML text for the Critical Path Analysis.

```
plunify> results add job 123
plunify> results export sample.html -criticalpath_html
```

This example exports the critical path analysis for the job "123".

Apply Strategy To New Project Revision

This will export the settings used to a new design run or revision in the FPGA tool.



A prompt will appear to ask you to accept the default revision name or specify a new one.

For Vivado, after exporting, the strategy that you selected will create 2 new runs named `explore_synth_1` and `explore_impl_1` for the synthesis and implementation portions respectively.

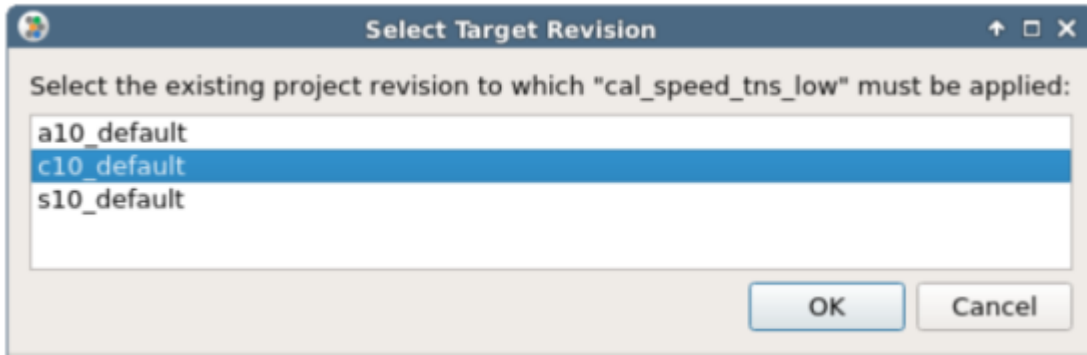
For Quartus, a new revision will appear with the same strategy name.

Create Bitstream (For Vivado only)

If bitstreams are not created by default, this option will generate the bitstream file in the `plunify.job/<jobid>` folder.

Apply Strategy To Existing Project Revision (For Quartus only)

This option will apply the settings of the strategy to a existing revision in Quartus. If there are multiple revisions available, InTime will prompt you for the right revision.

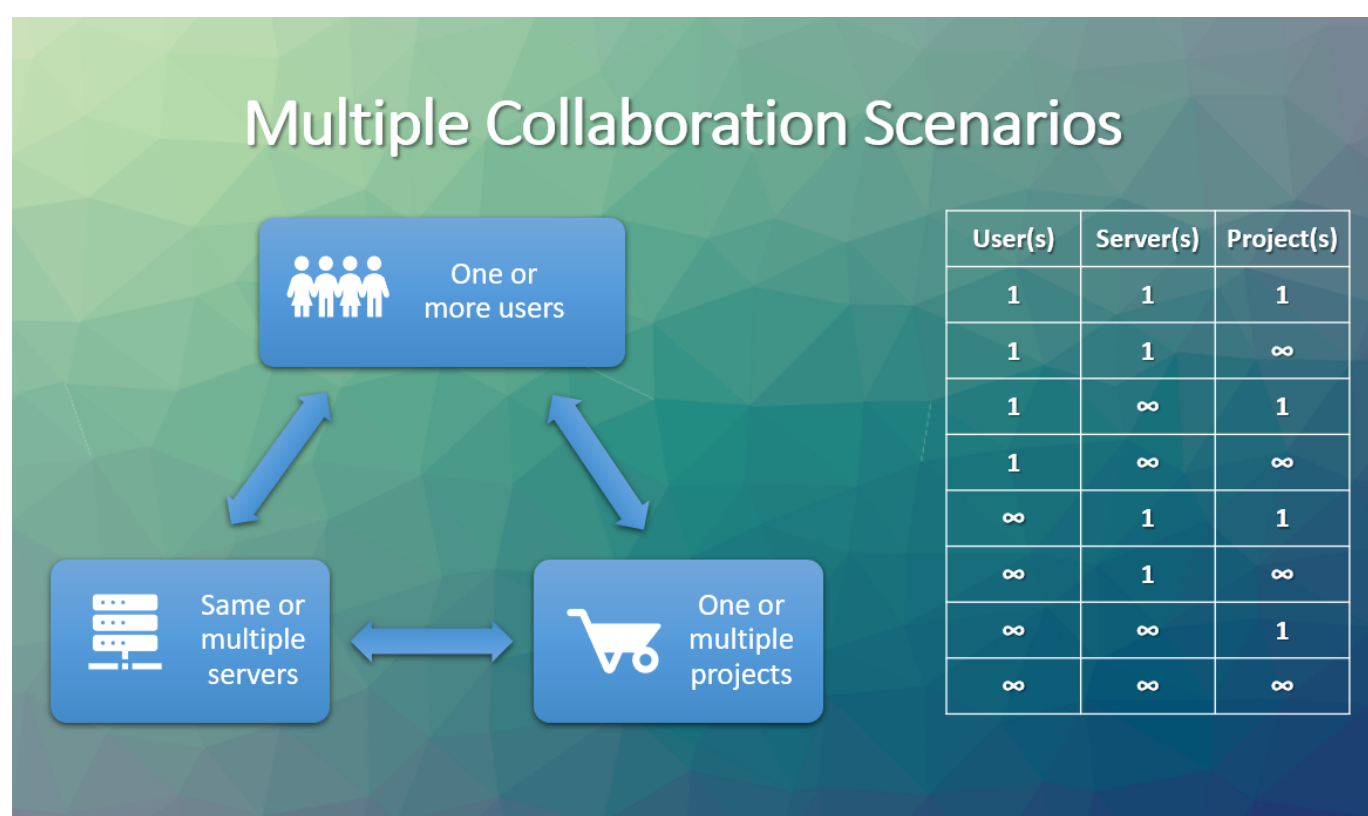


24. Sharing InTime Results

The data generated in InTime can be shared with other users across different projects. You can share data manually through the use of a file or via the InTime Server. This guide shows how to manage InTime data across multiple users and multiple servers.

24.1 Collaboration Scenarios

InTime supports a diverse range of users and IT infrastructures. A single user can access multiple servers and work on multiple projects in parallel. In another scenario, multiple users may be working on the same project in a distributed networked environment.



24.2 How Data is Organized

By Project Path (Design ID)

Every project new to InTime is assigned a unique Design ID. All results that are generated in InTime will be associated with this Design ID. This is supported in all versions of InTime.

By Design Tag

Starting from InTime v3.1.4, a customizable text identifier can be tagged to each project. Projects that are tagged with the same identifier will be considered part of the same "design" when InTime learns from the results.

24.3 Where Data is Stored

1. intimeruns.db

Every InTime client stores its data locally in a file called "intimeruns.db". The data may be a subset of the entire database in the InTime Server Database. There are 2 different modes.

Mode	File Location
User (default)	<user home>/~.plunify/<user_mac address>/intimeruns.db
Project	<project folder>/plunify.jobs/intimeruns.db

User mode

The path can be changed to point to any folder using the `custom_session_path` option, e.g. `/intime.sh - custom_session_path /mnt/mypath/`

Project mode (default)

This is the default mode. The database file will be stored in the `/plunify.jobs/` folder, and hence can be conveniently backed up via source control or shared with other users accessing the same project source files.

To enable this mode, close your project, run the Tcl command `misc set_runs_db project`. Re-open the project

2. InTime Server Database

If InTime is running in a networked environment with multiple users and machines, the data can be saved (manually or automatically) in the centralized InTime Server Database (ISD).

Important

What you See Is What You Get

Regardless of where data is stored, what you see in the history is what InTime uses for training and learning. If you don't see it in the history, that data is not part of the opened design.

History	1: Local Job ID	Job Hash	2: TNS	Worst Slack	Worst Setup
cv_default	459	07435c	-6.896	-0.571	-0.571
cv_default	455	e5c86d	-6.896	-0.571	-0.571
cv_default	371	52872d	-6.896	-0.571	-0.571
idefault_001	390	d2577c	-7.052	-0.661	-0.661
idefault_001	373	104f78	-7.052	-0.661	-0.661
cal_speed_tns_low	372	b692a1	-2.284	-0.45	-0.450
cal_speed_tns_low		52872d	-2.284	-0.45	-0.450
idefault_xp_00_6_0		52872d	-4.702	-0.574	-0.574
idefault_001		52872d	-7.052	-0.661	-0.661
idefault_002		52872d	-16.561	-1.111	-1.111
idefault_xp_01_6_31		52872d	-18.256	-1.182	-1.182

24.4 Share By Design Tag

What is Design Tag

Tagging a design with a unique string allows you to control how and when its data is going to be used or shared.

Current Project: /home/plunify/plunify/examples/vivado/eight_bit_uc_xpr/eight_bit_uc_xpr (Design Tag: special)									
Best Result: TNS of 0 in idefault_xp_00_0_0_2 from Job ID 456. Training Data: 1 filter applied. More details...									
History	1: Local Job ID	Job Hash	2: TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width
impl_1	460	933719	-0.981	-1.283	-0.233	-0.233	-0.305	0.063	0.282

Using the tag as an identifier, InTime syncs the relevant data quickly among different users, over multiple machines via the centralized InTime Server Database.

Each design can only have 1 tag. Changing the tag means overwriting the previous one. **The tag is tied to the design, not to individual results.**

How to tag your design or change a tag

In the GUI, under “Current Project”, select “Design Tag” option in the menu.



The image shows a dialog box titled "Design Tag". It has a text input field with the placeholder text "Enter one or more descriptive labels, separated by spaces." and the text "rev1" entered. Below the input field are two buttons: "OK" and "Cancel".

For Tcl command, type `project design_tag rev1` where rev1 is the new tag.

To change the tag, follow the same steps as above.

Upload to InTime Server Database

To automatically save a backup of your results to the InTime Server Database, check “Back-Annotate Results (InTime Server)”.

Strategies	
Algorithm	Educated
Custom Strategy	
Synthesis Name to Export	
Implementation Name to Export	
Auto-Adjust Clock Margin Value	<input checked="" type="checkbox"/>
- Clock Margin Initial Value	0.05
- Clock Margin Increment	0.05
Settings Scope	Restrictive
Strategy Prefix	
Max Runtime Unit	Hours
Max Runtime	24
Auto-Optimize Max Runtime	<input type="checkbox"/>
Back-Annotate Results (InTime Server)	<input checked="" type="checkbox"/>
Strategy Retries If Fail	3
Strategy Start Interval	5

Via InTime GUI: see Export Data to InTime Server

Via Tcl: run this command `results export -server_db`

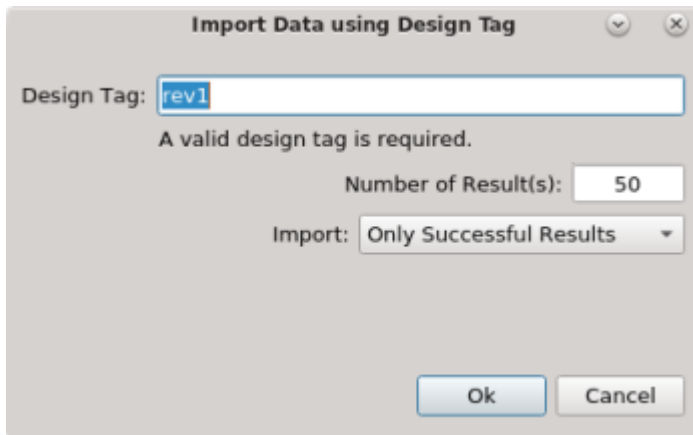
Note

If the Design Tag has been changed locally, the design tag on InTime Server database will also be updated in the next sync.

Import from InTime Server Database

GUI

Go to “File” > “Import with Design Tag”.



There are 3 fields:

1. Design Tag
2. Number of results to import - The maximum is 500.
3. “Only Successful Results” or “All Results”, which includes failed and not started.

Tcl Commands

Example 1: Import 50 results with the design tag **rev1**.

```
plunify> results import -server_db -all -n 50 -designtag rev1
```

Example 2: Import 20 successful results with the design tag **rev2**.

```
plunify> results import -server_db -success -n 20 -designtag rev2
```

Automatically Sync Data for New Projects

When you open a new project (without results) in InTime, InTime prompts you for a Design Tag. If you provide a Design Tag, InTime will pull data with a matching Design Tag from the InTime Server Database.

To turn off this feature, enter at the Tcl console: `misc set auto_import false`

24.5 Share by Project Path (Design ID)

There are 3 channels to import or export results.

1. Local database file

The data is already in the current intimeruns database file but is saved under a different project or design ID. Different projects are assigned a "design ID", which differentiates them. (Only for import)

2. InTime Server

The data can be imported from the centralized InTime Server Database or exported to it.

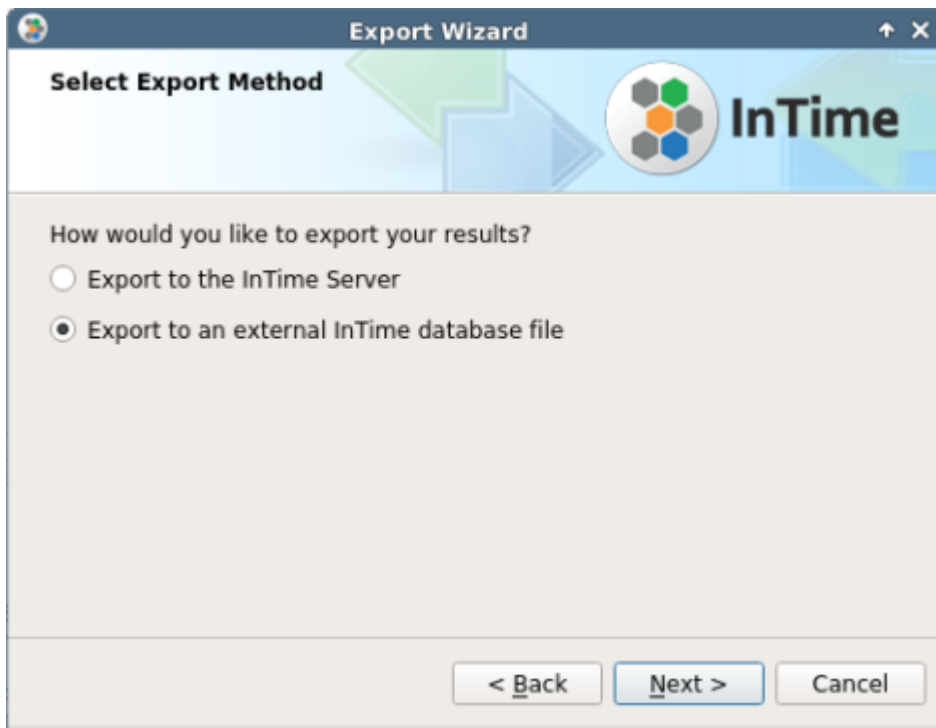
3. External database file

The data is in a file which is exported from other InTime clients or can be imported from into InTime clients.

24.6 Export

Export Data To Local File

To export data, select the `File > Export Results` menu option. This will start the Export Results Wizard.



To do this in Tcl, first select the jobs that needs to be exported, using the `results add` command.

Example, to export the results of the last job to a file, select the results of the last job, then export it.

```
plunify> results add last_job
plunify> results export /tmp/backup.export -local_db
```

Example, to export the results of job 333 to a file, select the results of the last job, then export it.

```
plunify> results add job 333  
plunify> results export /tmp/backup.export -local_db
```

This will export the last ran job to a local file `/tmp/backup.export`.

Export Data To InTime Server Database

To back up the data on the InTime Server Database, in the GUI, just select the option "Export to the InTime Server".

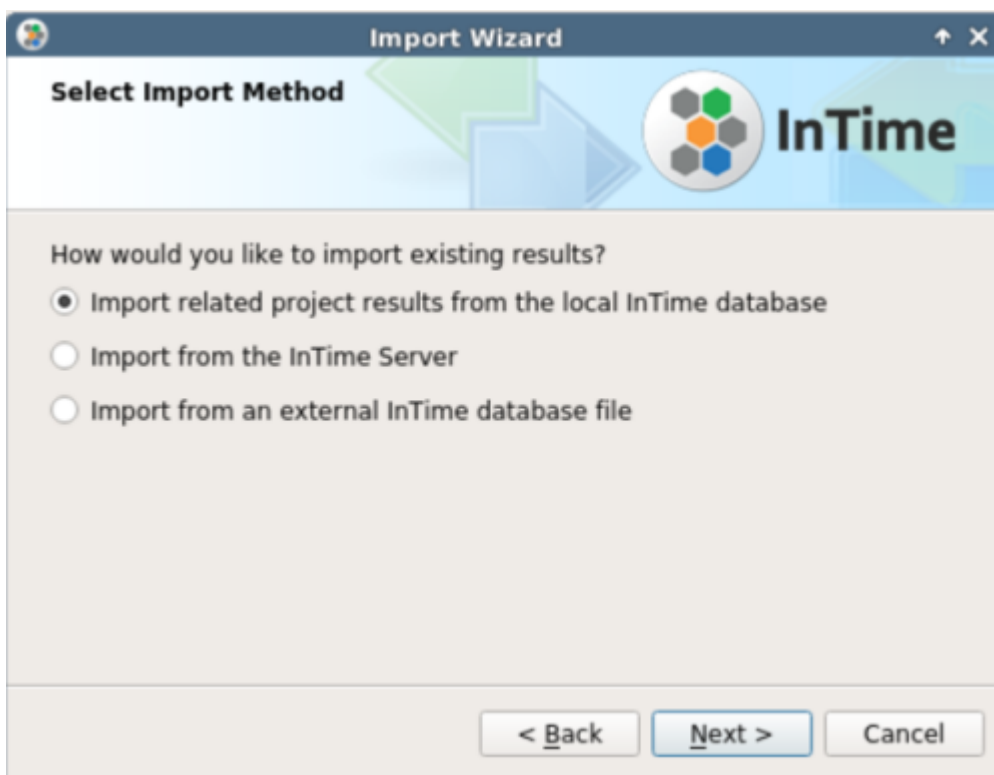
For Tcl, use the `-server_db` option. There is no need to specify a filename.

```
plunify> results export -server_db
```

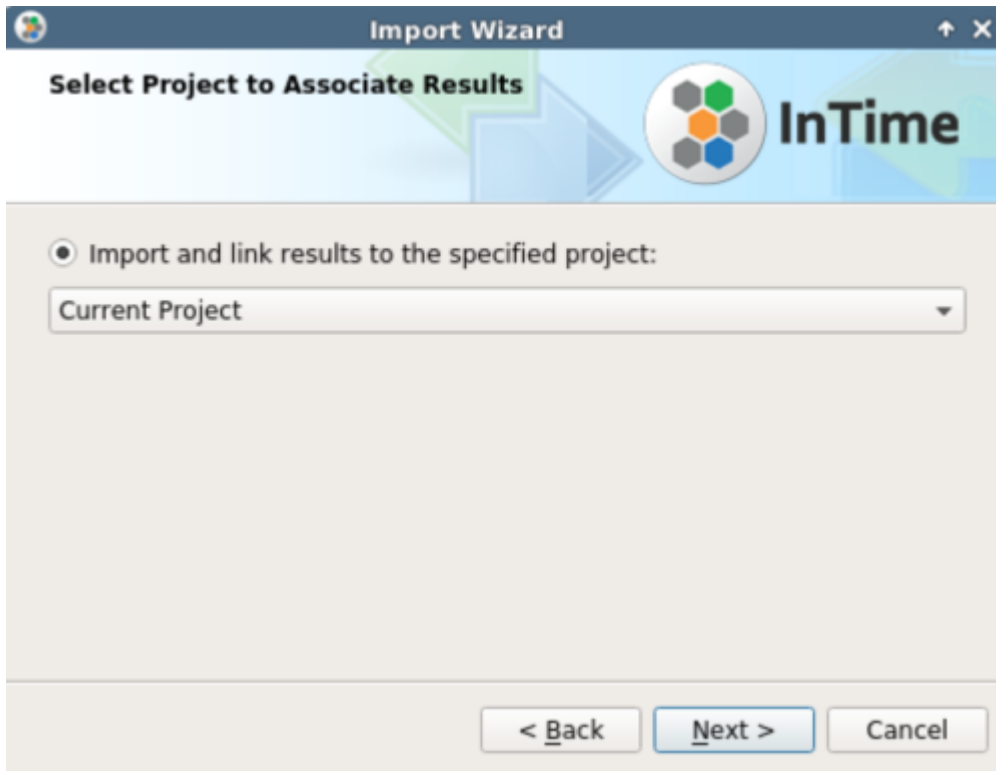
24.7 Import

Import Data From Local Database File

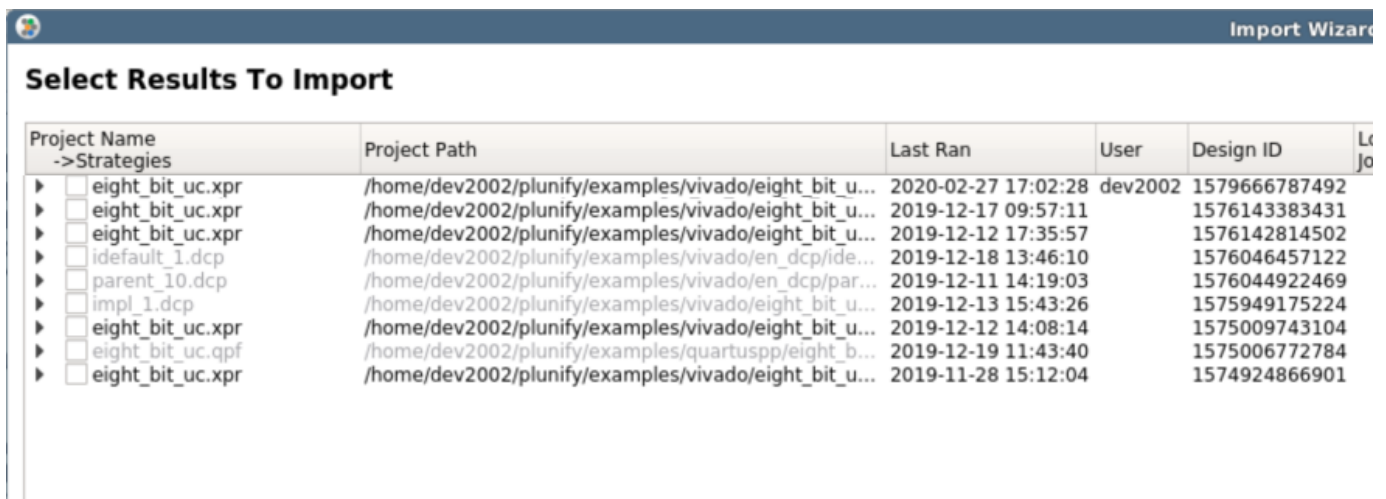
Select the `File > Import Results` menu option. This will start the Import Results Wizard below.



You can choose to import data into the current project or into another project.



The list of available results will be displayed. Use the checkboxes to select the project whose data you want to import into your current database. Click 'Next' to continue.



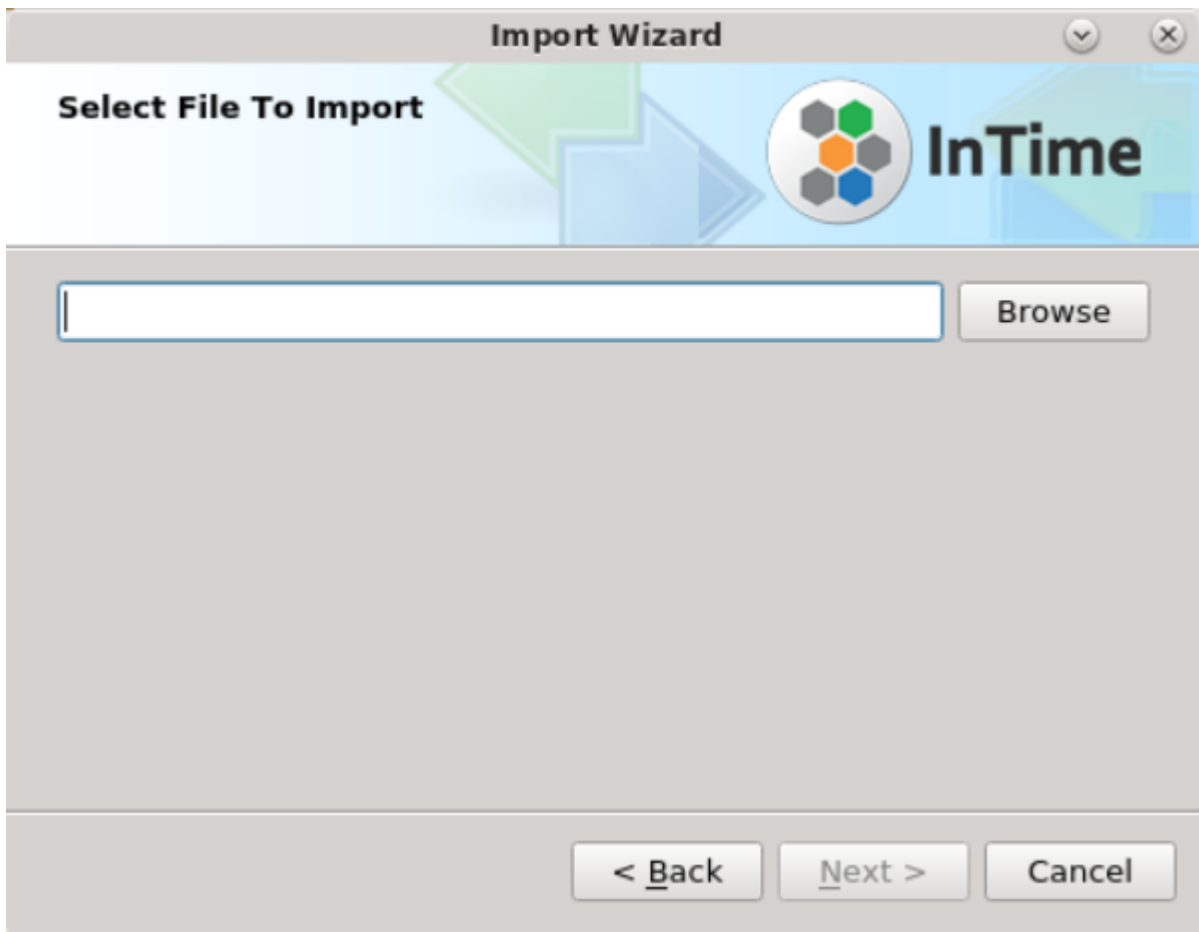
Importing via Tcl commands for this option is not supported.

Import From InTime Server Database

The steps are the same as "Import Data From Local Database File", except that the data source is from the InTime Server Database. Importing via Tcl commands for this option is not supported.

Import From External Database File

Similar to the previous 2 options, except that the filename of the data source is required.



In Tcl console, to import from an external file, using the `-local_db` option

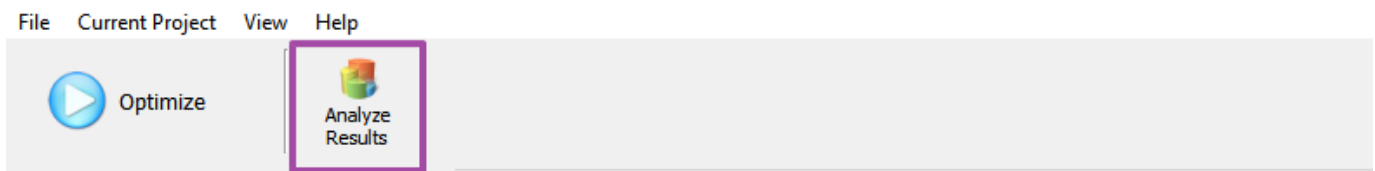
```
plunify> results import -local_db /tmp/backup.export
```

where `/tmp/backup.export` is the filename of the data source.

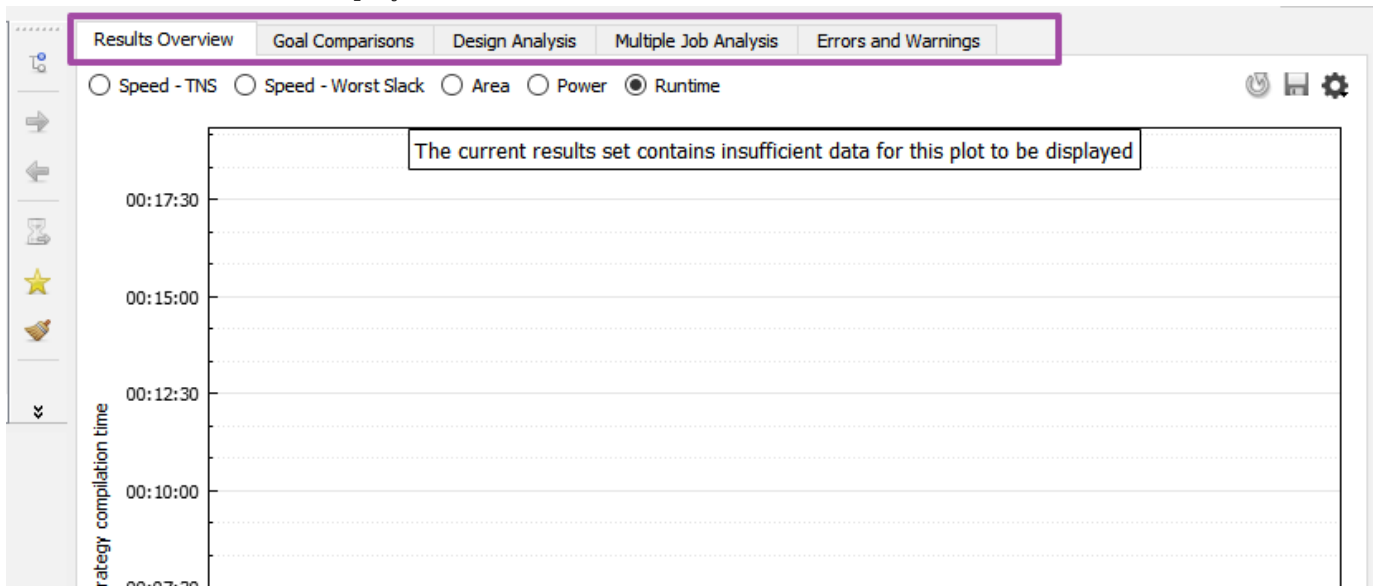
25. Analyzing InTime Results

25.1 Introduction

To analyze InTime results, there is a Results Analysis interface. To switch to this interface, click on the button "Analyze Result" in the InTime GUI.



A new GUI below will be displayed with 5 tabs.



Here is a brief description of the different analysis and charts.

Tab Name	Description
Results Overview	Plots a chart of all the runs showing TNS, Worst Slack, Area, Power, Runtime.
Goal Comparisons	Plots 2 different design attributes against each other. The attributes supported are TNS, Worst Slack, Area, Power.
Design Analysis	Analyzes the critical paths, multi-die, fanout across the select runs.
Multiple Job Analysis	Provides an overview and progress of the whole optimization process.
Errors and Warnings	Aggregate all the warnings and errors to give an overall view of the design.

25.2 Add Data for Analysis

Before viewing any analysis, select and add results data to the analysis dataset. There are 2 ways to choose the jobs or results.

1. Right-click on a existing job/strategy, and choose `Analyze Job <Job ID>` . This will **only** add this job (and its child jobs) to the pool of data to be analyzed.

Change	TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width	Area	Power
-1.2...	-1.4...	-0.213	-0.213	-0.252	0.091	0.282	0.8	0.132	
					0.081	0.282	0.84	0.133	
					0.115	0.282	0.76	0.134	
					0.079	0.282	0.81	0.133	

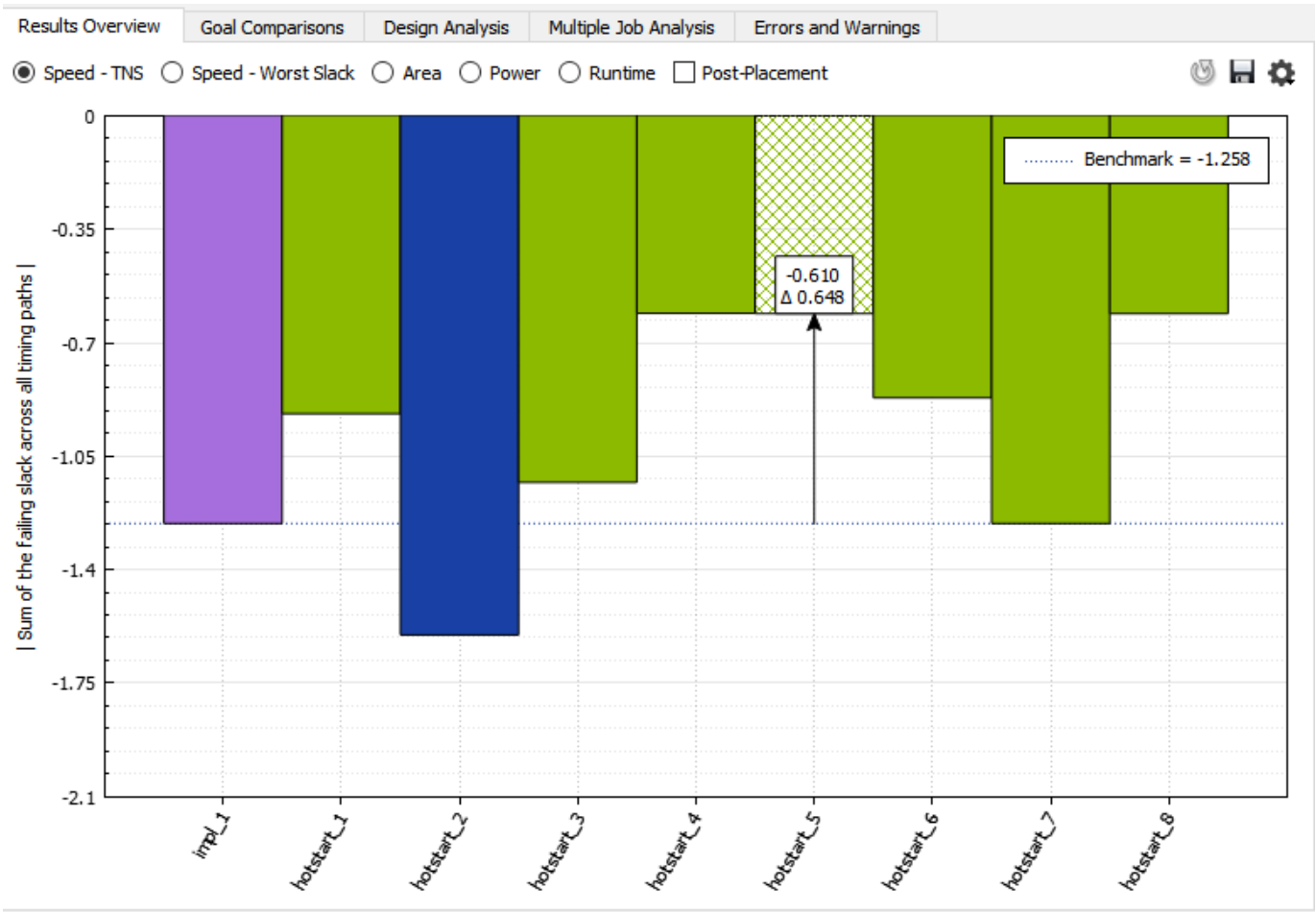
2. If you have existing data in the analysis set, you can also add additional multiple jobs for analysis simply by using the `Add Job <Jobd ID>` option. To add a single strategy, just click on the strategy and select the `Add <strategy name>` option.

To clear the Analysis, go to `View, Analysis` and `Clear Current Analysis`

25.3 Analysis Types & Charts

Results Overview

The "Results Overview" will automatically plot the values in a chart. The purple column is the original parent revision. The green columns represent results better than the parent revision and blue means worse. Selecting a column will reveal what is the actual value as well the difference between this and the parent revision.

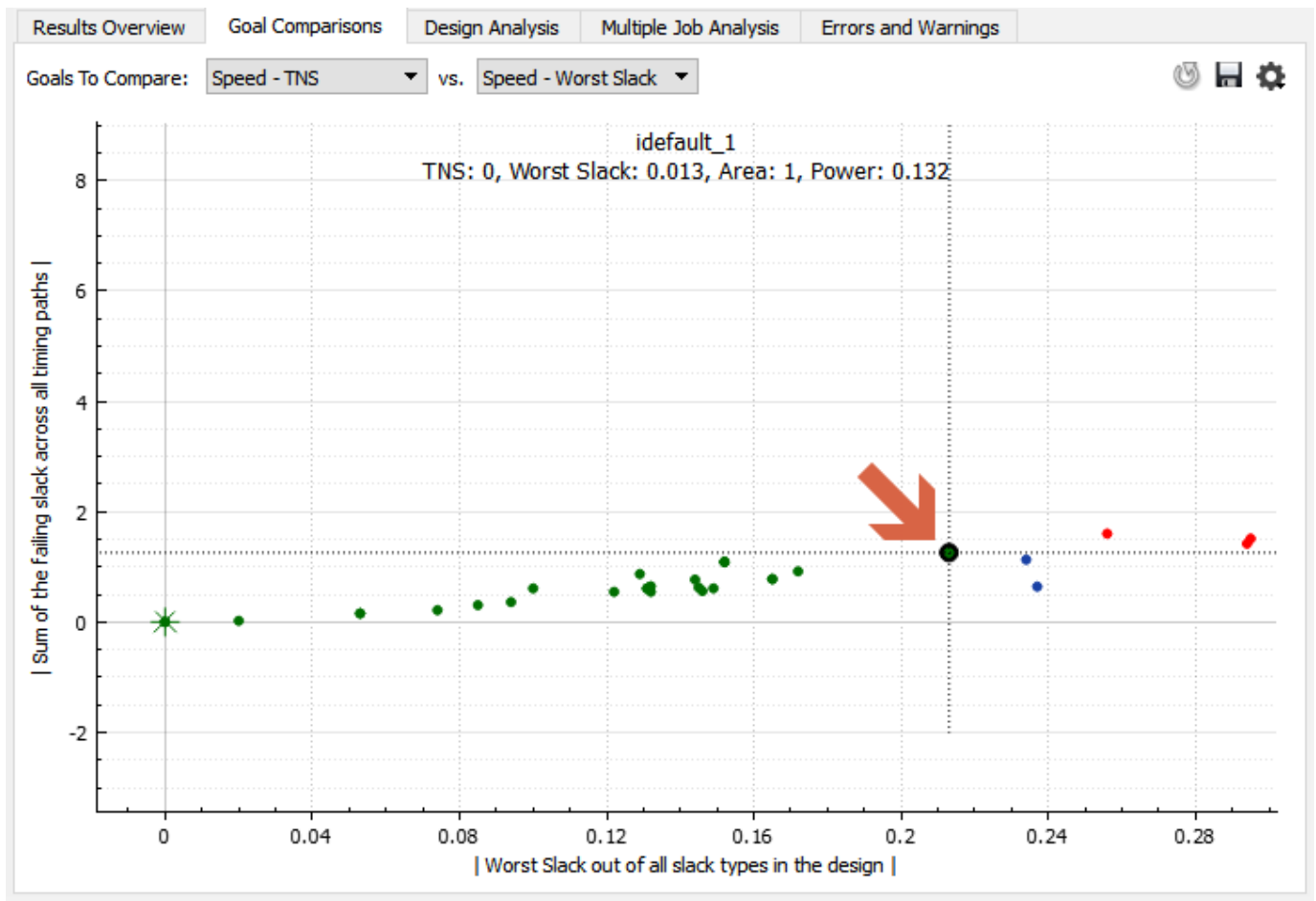


Post-Placement Estimates

For TNS and Worst Slack, there is an additional checkbox called "Post-Placement". This will plot the post placement timing estimates on the same chart.

Goal Comparisons

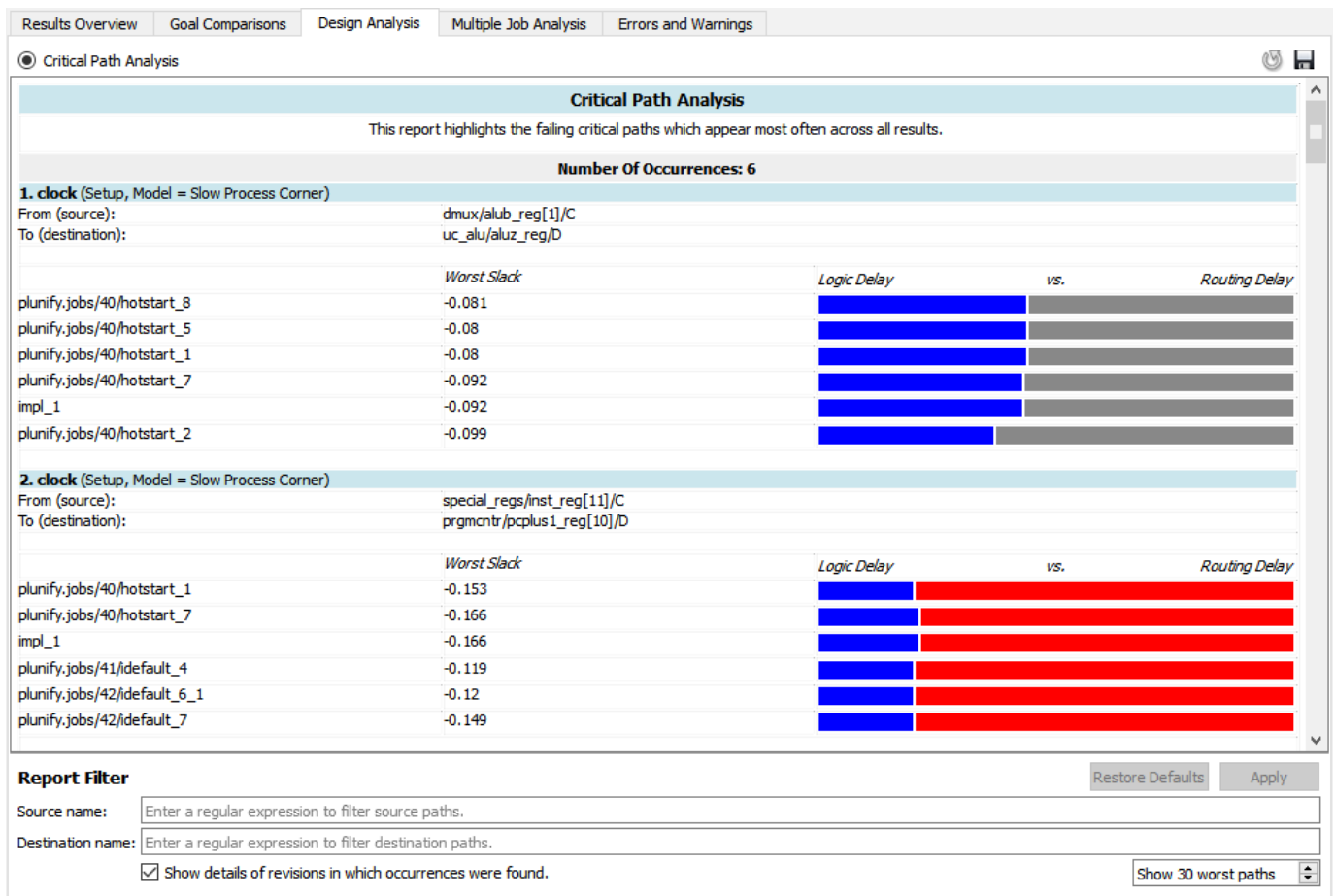
To understand where is the sweet spot between Area and Timing, the "Goal Comparison" chart can help provide insights. In the chart below, the dot indicated by the red arrow is the starting revision. All the points that are better for both axis will be coloured green. Blue is for one axis and red is if it is worse than the original on both axis.



Design Analysis

Critical Path Analysis

The Design Analysis tab provides insights on the critical paths in the design. The goal is to highlight the occurrences of the same critical path in the multiple builds. Refer to the Critical Path Analysis page to understand more.

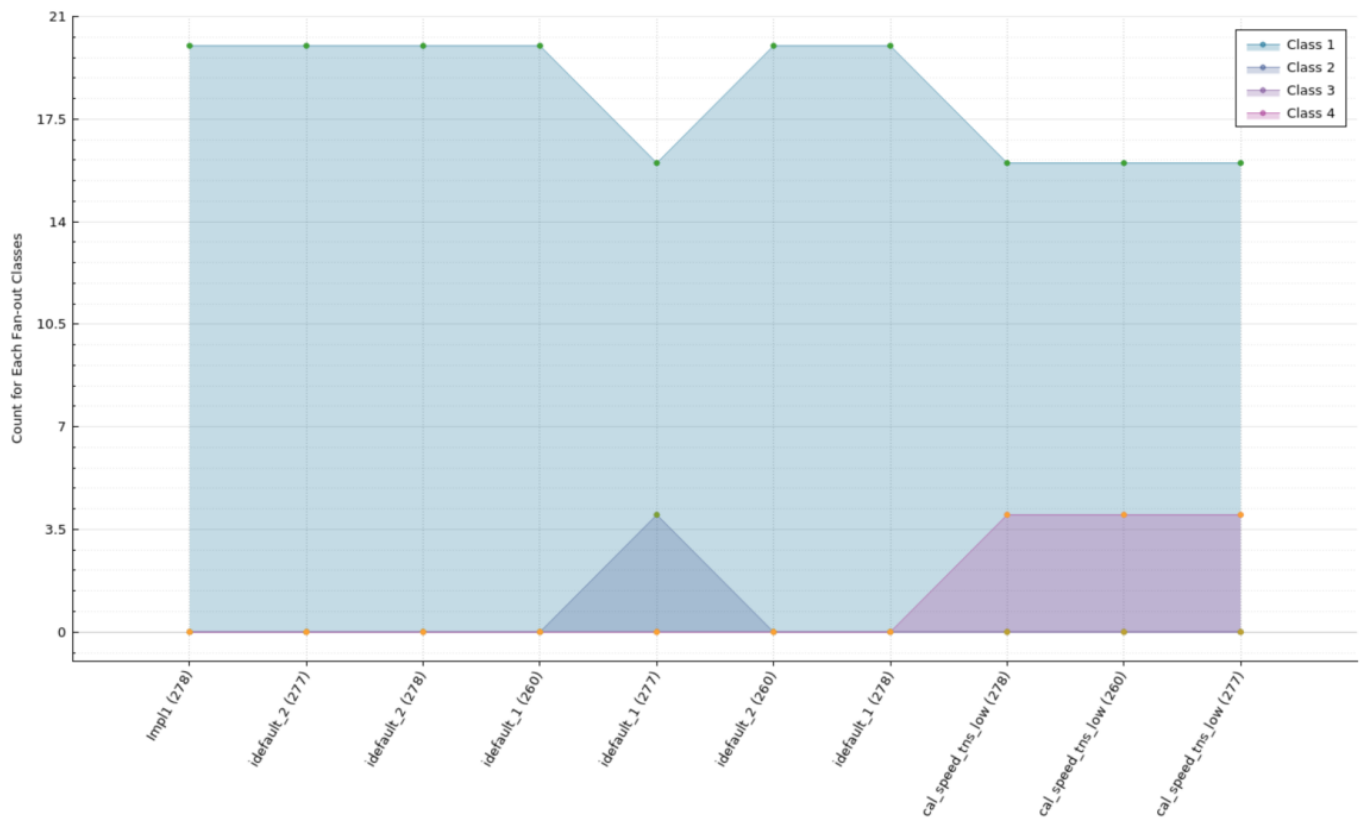


Multi-die Analysis

For Vivado devices with multiple dies, this analysis provides insights into the SLR crossings and how it affects the overall timing and performance. Refer to Multi-die Analysis for more details.

Fanout Analysis

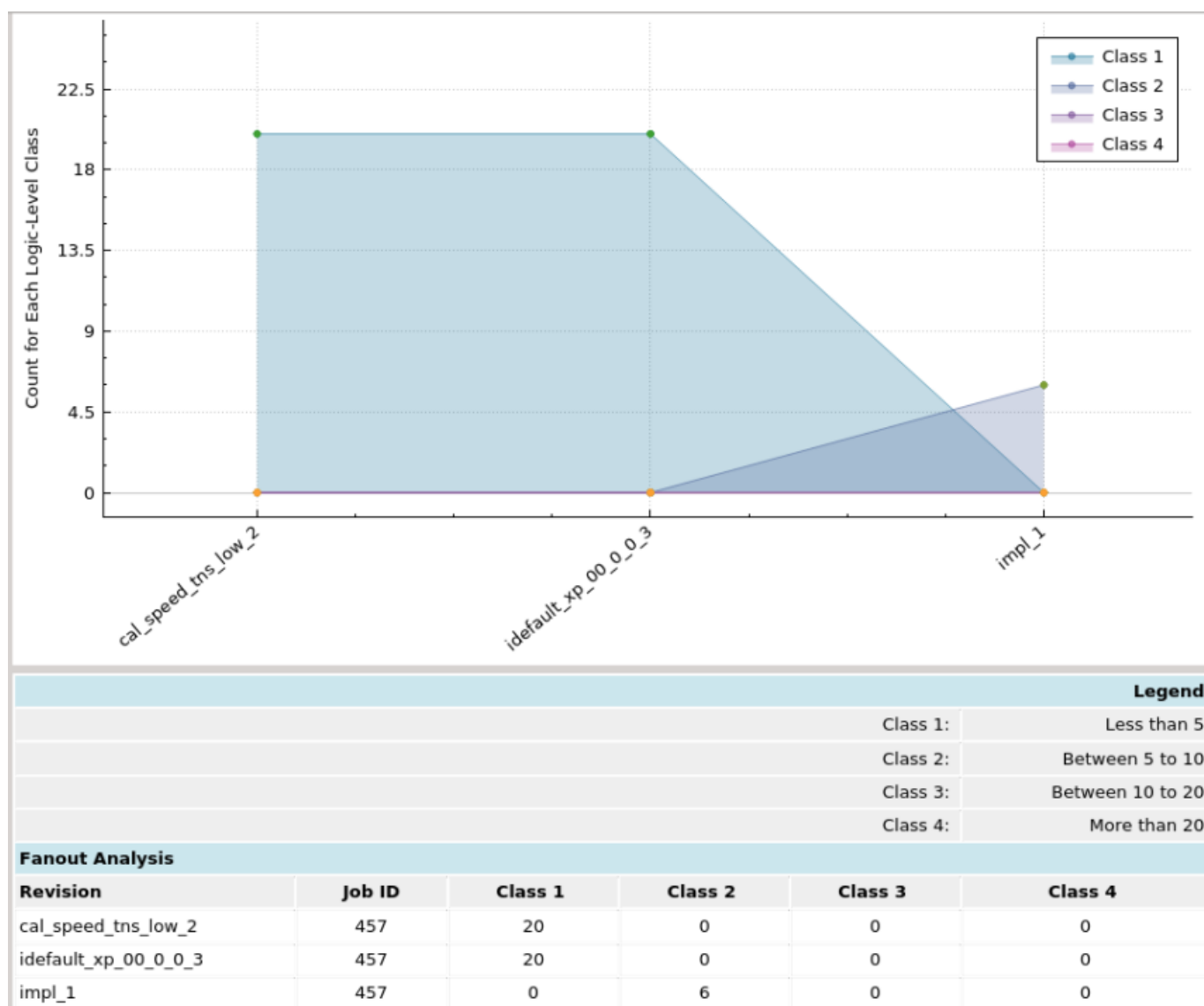
InTime classifies the fanout into 4 different severity groups. This chart provides an insight into how different fanout levels are correlated with the performance of the design.



Class type	Description
Class 1	Fanout is less than 125
Class 2	Fanout is greater or equal to 125 and less than 250
Class 3	Fanout is greater or equal to 250 and less than 500
Class 4	Fanout greater than 500

Logic Level Analysis

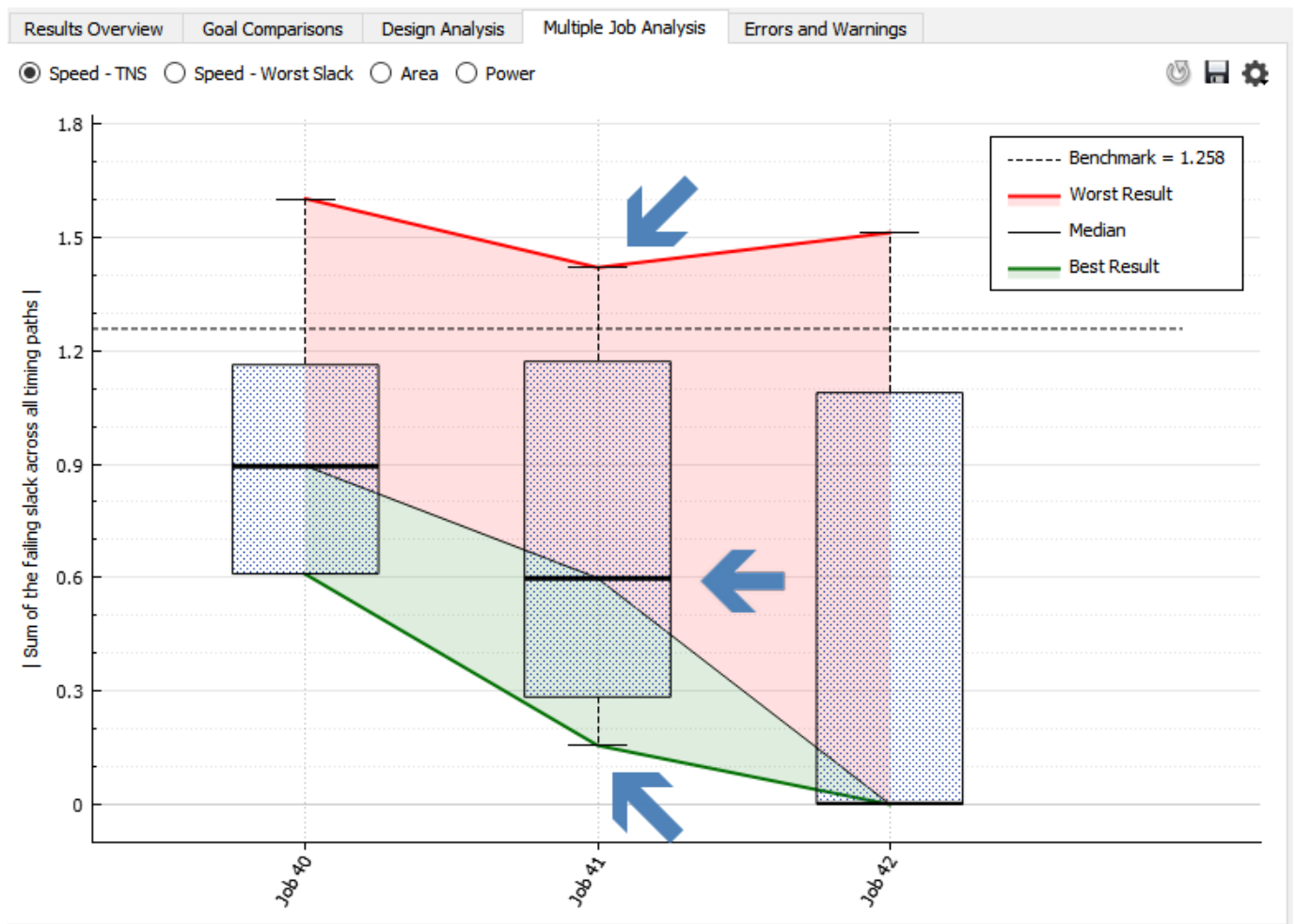
InTime classifies the logic levels into 4 different severity groups. This chart provides insights into how different logic levels correlate with the design's performance.



Class type	Description
Class 1	Logic Level is less than 5
Class 2	Logic Level is greater or equal to 5 and less than 10
Class 3	Logic Level is greater or equal to 10 and less than 20
Class 4	Logic Level greater than 20

Multiple Job Analysis

Provides an overview and progress of the whole optimization process. In this chart, each job is denoted in a column. (Note that the Y-axis of the chart inverts the negative values) There are 3 main lines in this chart (denoted by the blue arrows). The red line indicates the worst result in this job. The black thick line is the median (50th percentile) and the green line is the best result of this job.



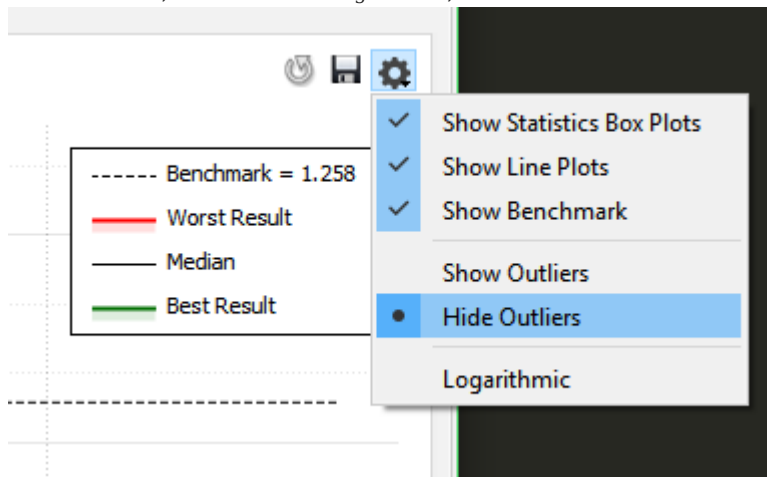
The main use of this chart is to check whether the learning gains are diminishing. One of the key sign is that the black line is plateauing. This usually starts happening after 3 rounds of learning recipe or about 50-80 strategies, e.g. Default.

Tip: Use chart settings - Hide outliers

The FPGA tools can give a very wide spread of values for different results, especially for TNS. In the charts below, both are showing the same dataset in the analysis. However, the one on the left includes 1 outlier datapoint. By hiding the outlier, the chart is more intuitive and easier to comprehend.



To hide outliers, click on the Settings button, and choose "Hide Outliers".



Errors and Warnings

This tab aggregates all the warnings and errors to give an overall view of the design. Given the high number of warnings, info messages, it is easy to miss out important warnings, such as "critical warnings". Aggregating the warnings gives a fast, simplified and straightforward grasp of the important warnings and errors. For example, if a critical warning in placement is happening across all the strategies, it is an indication of a design issue.

An explanation of the columns is provided below.

Warnings								
Total Occurrences	Occurrences Rate	Step	Message ID	Examples	Max Occurrences	Min Occurrences	Tag	
98	80.00%	opt_design	Runs 36-537	WARNING: File F:/40/hotstart_impl_1_pre_opt_design_action.td is not part of fileset utils_1, but has specified as a Td hook script for run(s) hotstart_impl_1. This file will not be handled as part of the project for archive and other project based functionality.	cal_speed_tns_low_1(9)	hotstart_7(6)	V	
106	73.33%	place_design	Vivado 12-180	WARNING: No cells matched 'get_cells -filter { REF_NAME =~ LUT* } -of_object {{regs/addr_reg/C --> regs/mem_regfile_reg_0_31_0/SP/ADR1}}'.	hotstart_4(7)	hotstart_1(11)	V	
10	66.67%	route_design	Route 35-39	CRITICAL WARNING: The design did not meet timing requirements. Please run report_timing_summary for detailed reports.	hotstart_1(1)	hotstart_1(1)	V	
12	80.00%	reporting	Timing 38-282	CRITICAL WARNING: The design failed to meet the timing requirements. Please see the timing summary report for details on the timing violations.	hotstart_1(1)	hotstart_1(1)	V	
2	13.33%	route_design	Route 35-328	WARNING: Router estimated timing not met.	hotstart_7(1)	hotstart_7(1)	V	
58	26.67%	synth_design	Synth 8-3332	WARNING: Sequential element (prgmcntr/pc_reg_rep) is unused and will be removed from module eight_bit_uc.	idefault_1(28)	cal_speed_tns_low_1(10)	V	
4	26.67%	opt_design	Constraints 18-5210	WARNING: No constraints selected for write.	cal_speed_tns_low_1(1)	cal_speed_tns_low_1(1)	V	
2	13.33%	opt_design	Vivado_Td 4-1090	WARNING: -remap and -aggressive_remap are incompatible options. Only -aggressive_remap will be applied.	cal_speed_tns_low_1(1)	cal_speed_tns_low_1(1)	V	
2	13.33%	opt_design	Vivado_Td 4-240	WARNING:	cal_speed_tns_low_1(1)	cal_speed_tns_low_1(1)	V	
3	6.67%	synth_design	Netlist 29-101	WARNING: Netlist 'eight_bit_uc' is not ideal for floorplanning, since the cellview 'eight_bit_uc' contains a large number of	idefault_1(3)	idefault_1(3)	V	

Column Names	Description
Total Occurrences	The total number of occurrences across all the results in the analysis.
Occurrences Rate	The overall occurrence rate (%) across all the results in the analysis.
Step	FPGA flow step where this happened.
Message ID	FPGA vendor specific warning or error ID.
Examples	Sample warning or error message.
Max Occurrences	Strategy with the maximum number of occurrences.
Min Occurrences	Strategy with the minimum number of occurrences.

26. Design Analysis

26.1 Critical Path Analysis

The Design Analysis tab provides insights on the critical paths in the design. The goal is to highlight the occurrences and details of the same critical path in the multiple results. By aggregating the analysis, the user can use this to identify and prioritize which critical path to fix in the design.

The screenshot shows the 'Critical Path Analysis' window with the following data:

Critical Path Analysis			
This report highlights the failing critical paths which appear most often across all results.			
Number Of Occurrences: 6			
1. clock (Setup, Model = Slow Process Corner)			
From (source):	dmux/alub_reg[1]/C		
To (destination):	uc_alu/aluz_reg/D		
	Worst Slack	Logic Delay	vs. Routing Delay
plunify.jobs/40/hotstart_8	-0.081	<div></div>	<div></div>
plunify.jobs/40/hotstart_5	-0.08	<div></div>	<div></div>
plunify.jobs/40/hotstart_1	-0.08	<div></div>	<div></div>
plunify.jobs/40/hotstart_7	-0.092	<div></div>	<div></div>
impl_1	-0.092	<div></div>	<div></div>
plunify.jobs/40/hotstart_2	-0.099	<div></div>	<div></div>
2. clock (Setup, Model = Slow Process Corner)			
From (source):	special_regs/inst_reg[11]/C		
To (destination):	prgmctr/pcplus1_reg[10]/D		
	Worst Slack	Logic Delay	vs. Routing Delay
plunify.jobs/40/hotstart_1	-0.153	<div></div>	<div></div>
plunify.jobs/40/hotstart_7	-0.166	<div></div>	<div></div>
impl_1	-0.166	<div></div>	<div></div>
plunify.jobs/41/default_4	-0.119	<div></div>	<div></div>
plunify.jobs/42/default_6_1	-0.12	<div></div>	<div></div>
plunify.jobs/42/default_7	-0.149	<div></div>	<div></div>

Report Filter

Source name:

Destination name:

☒ Show details of revisions in which occurrences were found.

Show 30 worst paths

26.2 How to use

Total Occurences

Use the total occurrences as an indication as to which paths are affecting most of your results. Prioritize the any changes to these paths. In the screenshot, there are 6 occurrences in 4 jobs that were included in the analysis. The source and destination of the path, and each strategy and its worst slack is hidden/displayed.

Critical Path Analysis



Critical Path Analysis

This report highlights the failing critical paths which appear most often across all results.

Number Of Occurrences: 6



1. clock (Setup, Model = Slow Process Corner)

From (source): dmux/alub_reg[1]/C
To (destination): uc_alu/aluz_reg/D

2. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[11]/C
To (destination): prgmcntr/pcplus1_reg[10]/D

Number Of Occurrences: 5



1. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[11]/C
To (destination): prgmcntr/pcplus1_reg[6]/D

Number Of Occurrences: 4



1. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[5]/C
To (destination): prgmcntr/pcplus1_reg[7]/D

2. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[9]_replica/C
To (destination): prgmcntr/pcplus1_reg[4]/D

3. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[11]/C
To (destination): prgmcntr/pcplus1_reg[5]/D

4. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[5]/C
To (destination): prgmcntr/pcplus1_reg[8]/D

Number Of Occurrences: 3



1. clock (Setup, Model = Slow Process Corner)

From (source): special_regs/inst_reg[10]_replica/C
To (destination): prgmcntr/pcplus1_reg[9]/D

Report Filter

Restore Defaults

Apply

Source name:

Destination name:

☐ Show details of revisions in which occurrences were found.







Save results to PDF

If you want to do some external datamining, you also save the results to a pdf by clicking on the "Save" button at the top right.

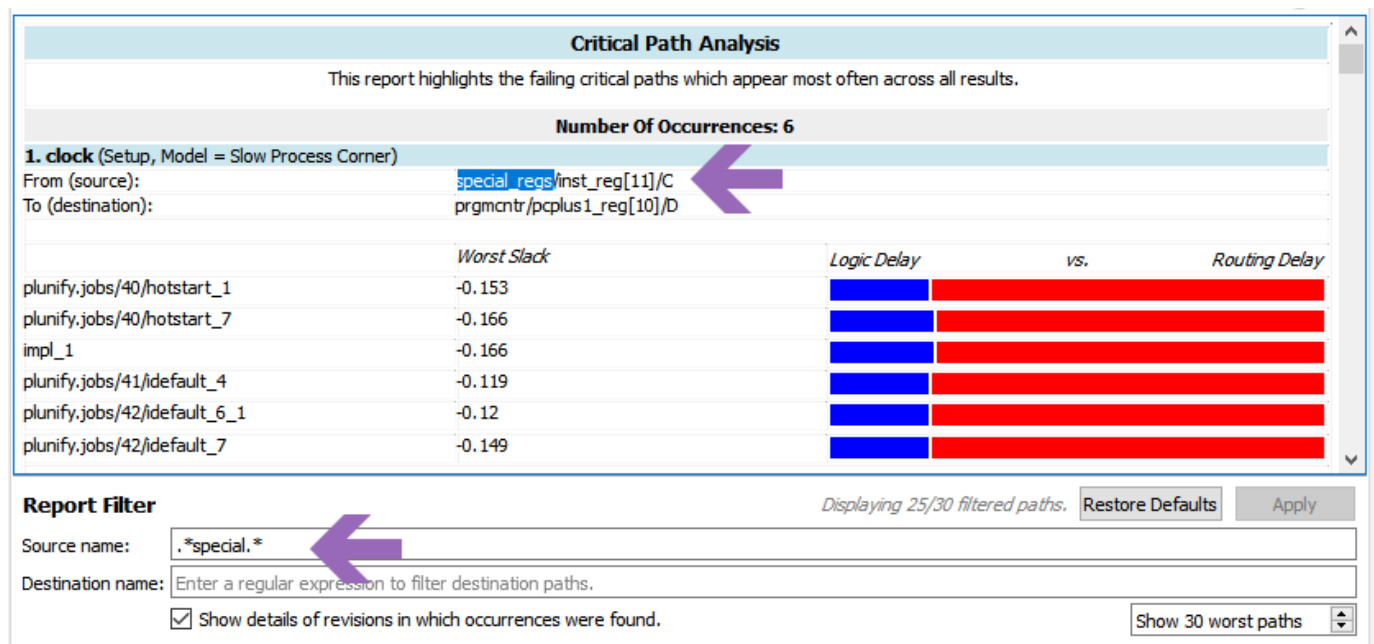
Logic versus Routing Delay

The colours bars on the right represent the ratio between logic delay and routing delay. Red means that it has excessive delay. An easy way to interpret this is as follows

Type	Colour	Description	Recommendations
Logic Delay		Logic delay is too high	Optimize synthesis - Run InTime Default recipe or use settings filters to explore more synthesis settings
Logic Delay		Logic delay is within expected threshold	No action required.
Routing Delay		Routing delay is within expected threshold	No action required.
Routing Delay		Routing delay is too high.	Optimize placement - Use hotstart, placement exploration. Use settings filters to whitelist routing settings to explore only routing.

Report Filters

To filter specific source or destination paths, you can specify the regular expressions in the report filters. For example, `.*special.*` will return the paths with the word **special** in it.



Critical Path Analysis













This report highlights the failing critical paths which appear most often across all results.

Number Of Occurrences: 6

1. clock (Setup, Model = Slow Process Corner)

From (source): `special_reqs/inst_reg[11]/C` ←

To (destination): `prgmctr/pcplus1_reg[10]/D`

	Worst Slack	Logic Delay	vs.	Routing Delay
plunify.jobs/40/hotstart_1	-0.153			
plunify.jobs/40/hotstart_7	-0.166			
impl_1	-0.166			
plunify.jobs/41/default_4	-0.119			
plunify.jobs/42/default_6_1	-0.12			
plunify.jobs/42/default_7	-0.149			

Report Filter

Source name: `.*special.*` ←

Destination name:

☒ Show details of revisions in which occurrences were found.

Displaying 25/30 filtered paths. [Restore Defaults](#) [Apply](#)

[Show 30 worst paths](#)

To clear the filters, just click on the "Restore Defaults" button.

26.3 Multi-die Analysis

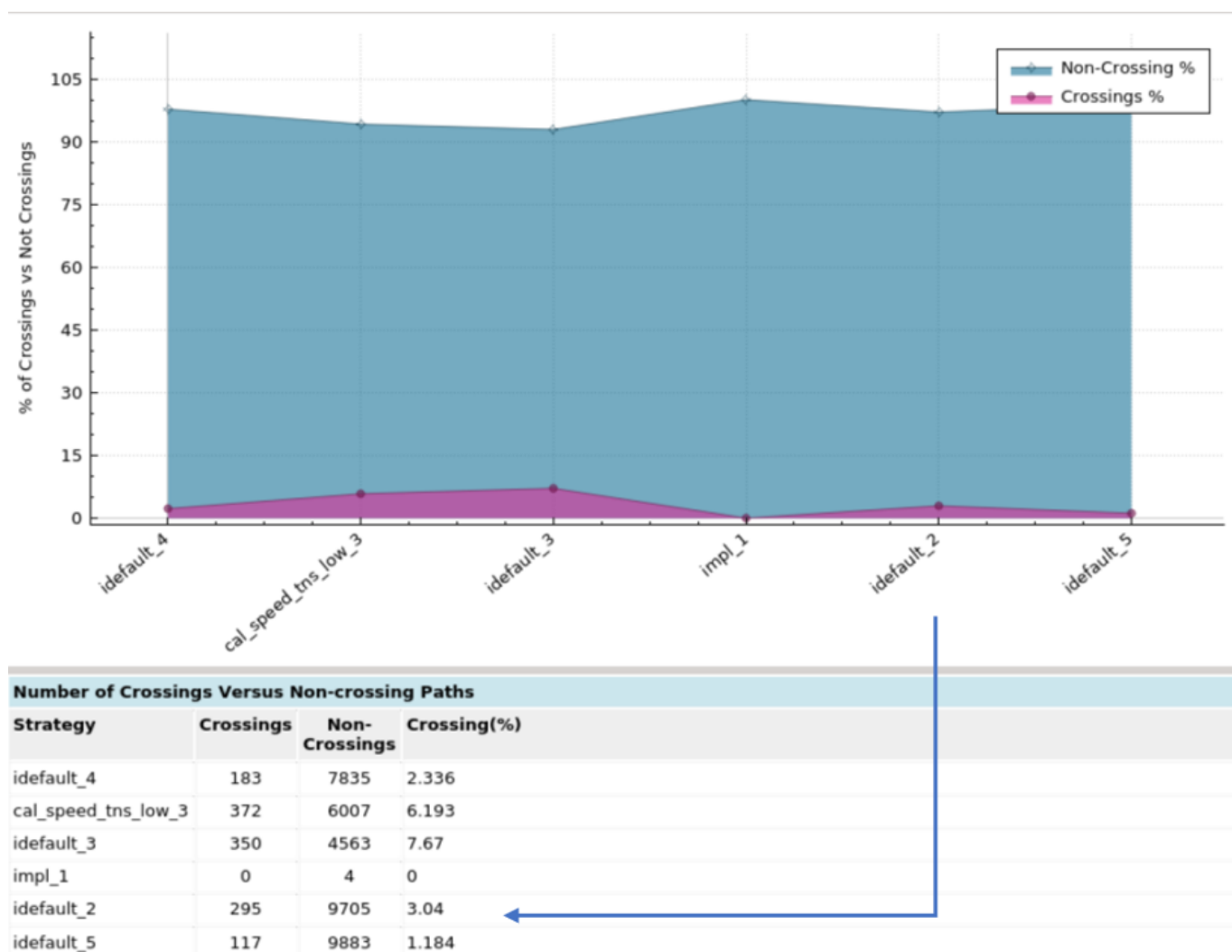
27. Multi-die Analysis

27.1 Introduction

This section provides insights on die crossings in the design. Specifically, it highlights the frequency and details of critical paths that cross die boundaries. By aggregating multiple results, one can identify results with the least crossings or see if the crossings are performance bottlenecks.

27.2 Crossings versus Non-Crossings

The first chart and table compares the number of critical paths crossing dies versus those not crossing dies. Generally, a lower percentage of path crossings correlates to better overall design performance.



27.3 Worst Crossing Per Die

This table shows which path has the worst slack that crosses one or more dies. It also shows the source and destination die.

Worst Slack (Crossing) Per SLR				
Strategy	SLR	Slack	Source Instance	Destination Instance
idefault_4	0	None		
	1	-0.454	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/gen_samd.crossbar_samd/gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-0.463	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/auto_us/inst/gen_upsizer.gen_full_upsizer.axi_upsizer_inst/
cal_speed_tns_low_3	0	None		
	1	-0.435	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/gen_samd.crossbar_samd/gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-0.471	eth100g_ernic_i/axi_interconnect_0/xbar/inst/gen_samd.crossbar_samd/gen_master_slots[0].reg_slice_mi/r.r_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/r.r_pipe
idefault_3	0	None		
	1	-0.387	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/gen_samd.crossbar_samd/gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-0.407	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/s04_couplers/auto_us/inst/
impl_1	0	None		
	1	None		
	2	None		

27.4 Total Negative Slack Per Instance

This table groups crossing paths based on source and destination instances. It shows which instance has the highest aggregate slack that crosses one or more dies.

Total Negative Slack (Crossing) Per SLR				
Strategy	SLR	Slack	Source Instance	Destination Instance
idefault_4	1	-4.12	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/ gen_samd.crossbar_samd/ gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-23.52	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_us/inst/ gen_upsizer.gen_full_upsizer.axi_upsizer_inst/ USE_WRITE.gen_non_fifo_w_upsizer.write_data_inst
cal_speed_tns_low_3	1	-8.34	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_cc/inst/ gen_clock_conv.gen_async_conv.asyncfifo_axi/ inst_fifo_gen/ gaxi_full_lite.gwrite_ch.gwdch2.axi_wdch/ grf.rf/gntv_or_sync_fifo.gl0.wr/gwas.wsts	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe
	2	-59.17	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_us/inst/ gen_upsizer.gen_full_upsizer.axi_upsizer_inst/ USE_WRITE.gen_non_fifo_w_upsizer.write_data_inst
idefault_3	1	-9.32	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/ gen_samd.crossbar_samd/ gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-45.52	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_us/inst/
idefault_2	1	-11.35	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_cc/inst/ gen_clock_conv.gen_async_conv.asyncfifo_axi/ inst_fifo_gen/	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe
	2	-45.84	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/auto_us/inst/ gen_upsizer.gen_full_upsizer.axi_upsizer_inst/ USE_WRITE.gen_non_fifo_w_upsizer.write_data_inst
idefault_5	1	-6.31	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/r.r_pipe	eth100g_ernic_i/axi_interconnect_0/xbar/inst/ gen_samd.crossbar_samd/ gen_master_slots[0].reg_slice_mi/r.r_pipe
	2	-10.18	eth100g_ernic_i/ernic_0/inst/ inst_resp_handler/inst_resp_handler_fsm	pcie_xdma_sub_i/data_plane_axi_intercon/ s04_couplers/s04_regslice/inst/w.w_pipe

Overall, the multi-die analysis provides insights into which instances are responsible for inter-die slacks and how these instances can be better placed.

28. Learning Analysis

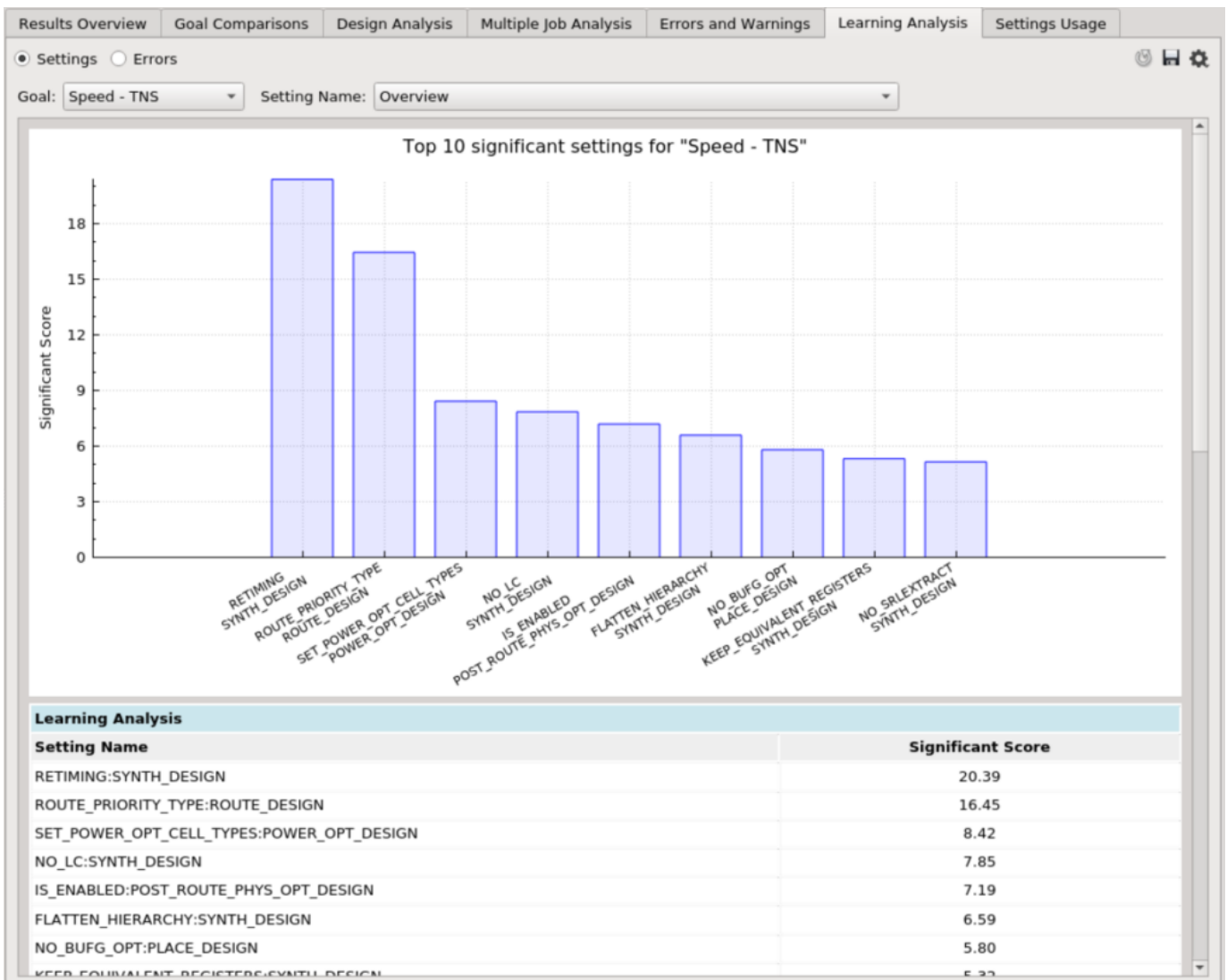
28.1 Settings

Introduction

The Learning Analysis (Settings) tab suggests which settings are significant to the goals. Users can adjust the values of the settings based on this analysis.

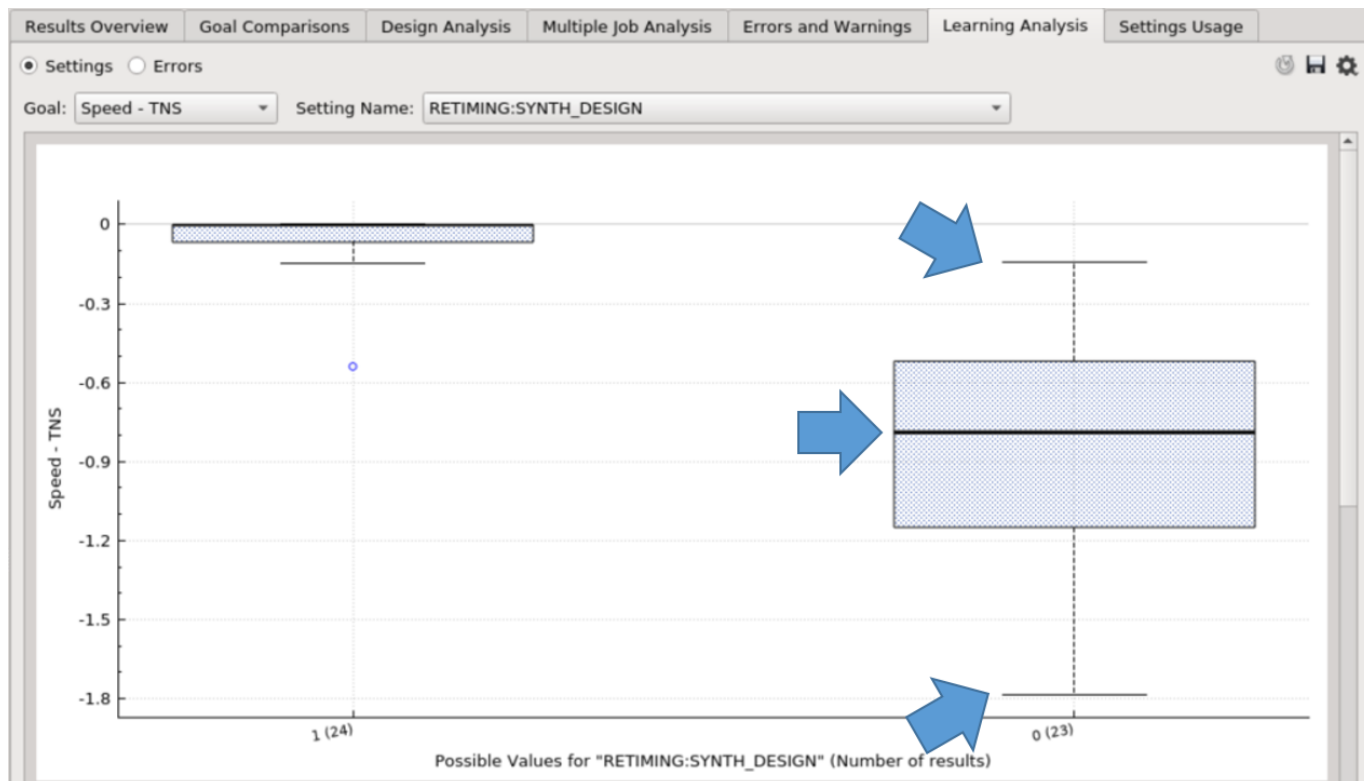
Overview Chart

This chart shows the top 10 settings, where a higher score means that that particular setting is more significant towards influencing the goal. Users can click a bar to find out the value with better or worse results. Fully-ranked settings are shown in the table below.

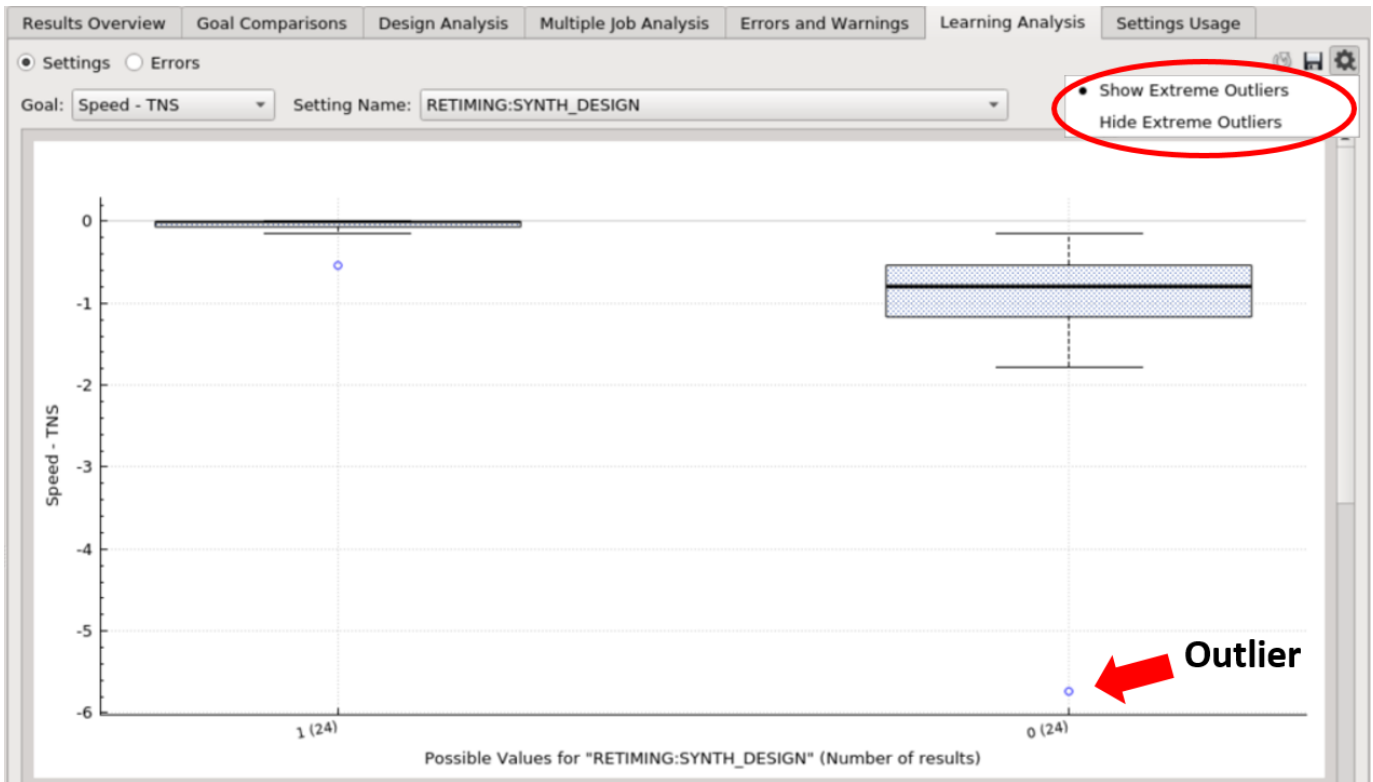


Settings Chart

Each setting shows the distribution of results for every possible value. There are three main lines denoted by the blue arrows. The topmost line is the best result of this value, the black thick line is the median (50th percentile), and the bottom line is the worst result of this value.



Users can toggle between "Show" / "Hide Extreme Outliers" (values that are far from other values). Hiding outliers is the default behavior so that the chart is easier to comprehend.



28.2 Errors

Introduction

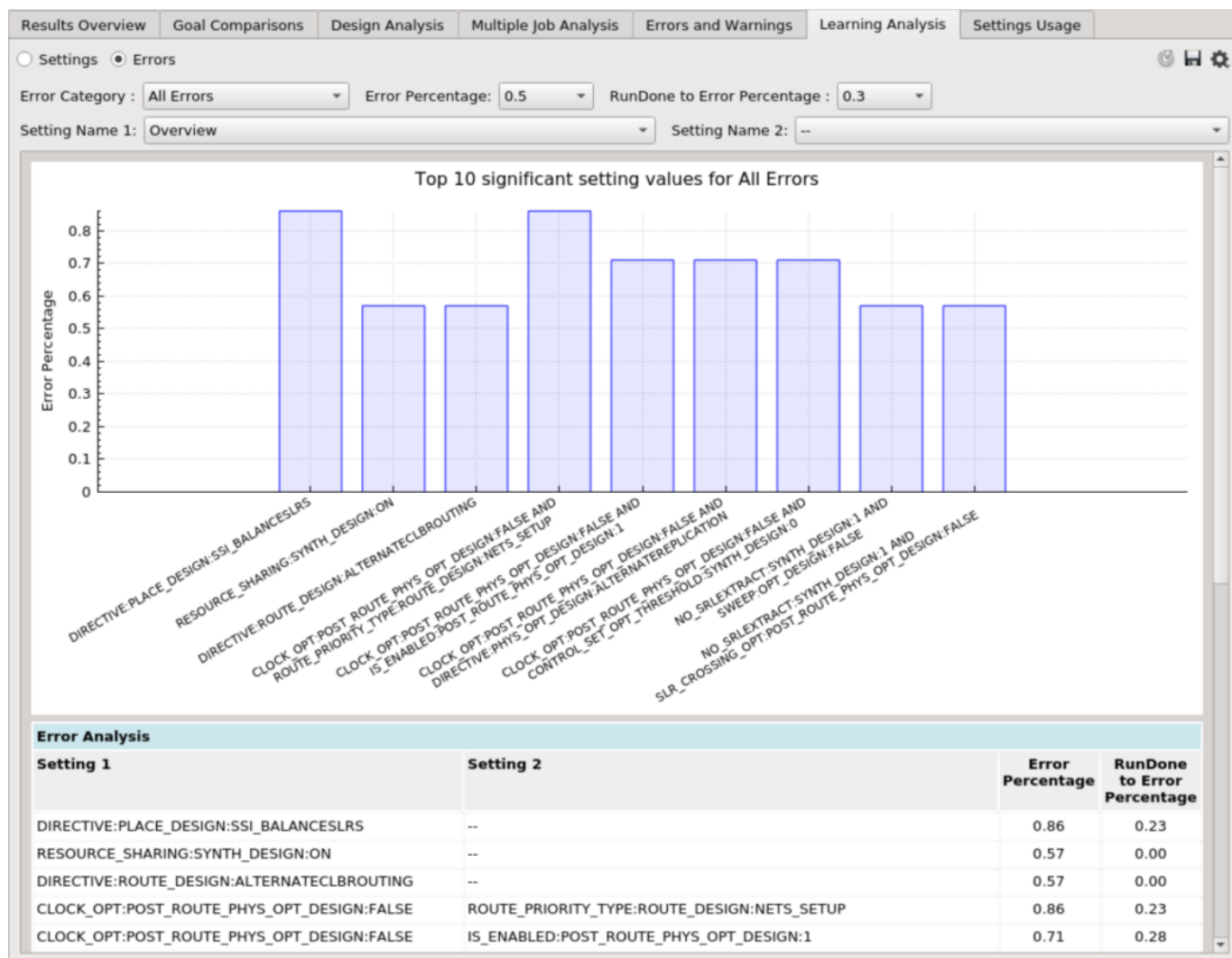
The Learning Analysis (Errors) tab suggests which settings are significant in terms of the errors, or a certain error category. Users can adjust the values of the settings based on this analysis.

Overview Chart

The overview chart shows the top 10 significant settings' values. There are two parameters to adjust for this chart:

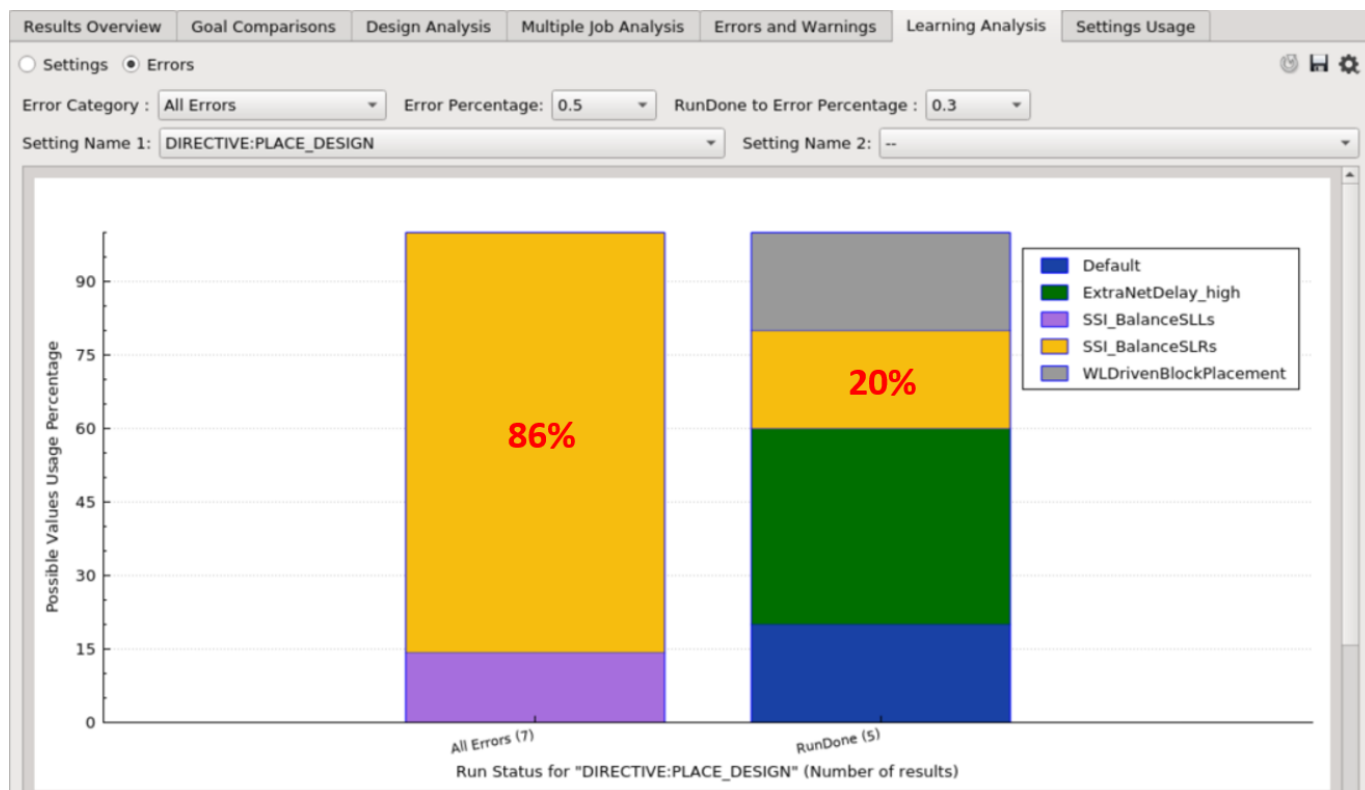
1. Error Percentage - the usage percentage of a setting's value among all error results. Setting values above this percentage will be shown in the chart, and a higher percentage gives a stricter restriction.
2. Example: if the value is 0.5 (meaning 50%), it means that if X setting is used more than 50% of the time in the erroneous results being analyzed, it will be in the analysis.
3. RunDone to Error Percentage - RunDone Percentage (the usage percentage of a setting's value among all successful results) divided by the Error Percentage. Setting values below this percentage will be shown in the chart, and a lower percentage gives a stricter restriction.
4. Example: if the value is 0.3 (meaning 30%), it means that if the ratio of the percentage of X setting in the successful results to the erroneous results is less than 30%, it will be in the analysis.

Users can click a bar to view a specific setting's usage for both erroneous and successful results. The fully-ranked setting's values are shown in the table below.



Settings Chart

Each setting's chart compares the usage of the values between erroneous and successful results. A value is significant to the error if it has a high Error Percentage (the yellow box on the left), and a low RunDone Percentage (the yellow box on the right).



There is also an option to compare the usage of the values between two setting combinations. Each color within a bar represents the possible value combinations between two settings.



28.3 Connectivity Graph

Introduction

The Learning Analysis (Connectivity) tab shows a connectivity graph that represents the selected strategy. This is to assist users who are floorplanning their design, to visualize the design hierarchy from two aspects:

1. Connectivity - How different design instances are connected.
2. Timing - How critical is the connection between the 2 instances.

Different revisions and floorplanning options will generate different graphs depending on the level of hierarchy being analyzed, and/or how critical are the connections between any two instances.

Generate .graph files

The graph visualization is generated from a file (.graph). This file is automatically generated with the `auto_floorplan` recipe with the congestion mode (see Tcl reference: `fp_type = congestion`). After adding the job to the analysis, all available .graph files are listed in the dropdown menu for selection.

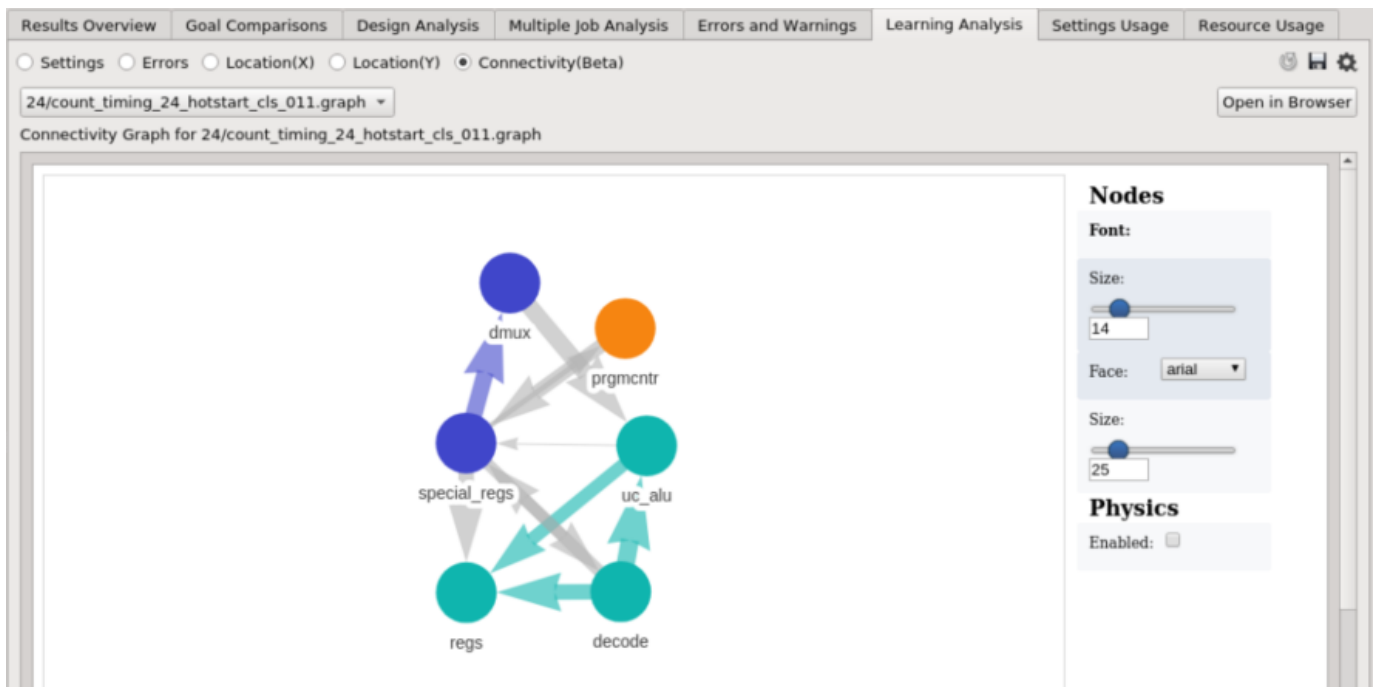
Otherwise for other strategies, users need to run this Tcl command,

```
misc gen_connect <job id> <revision name> to generate the required files.
```

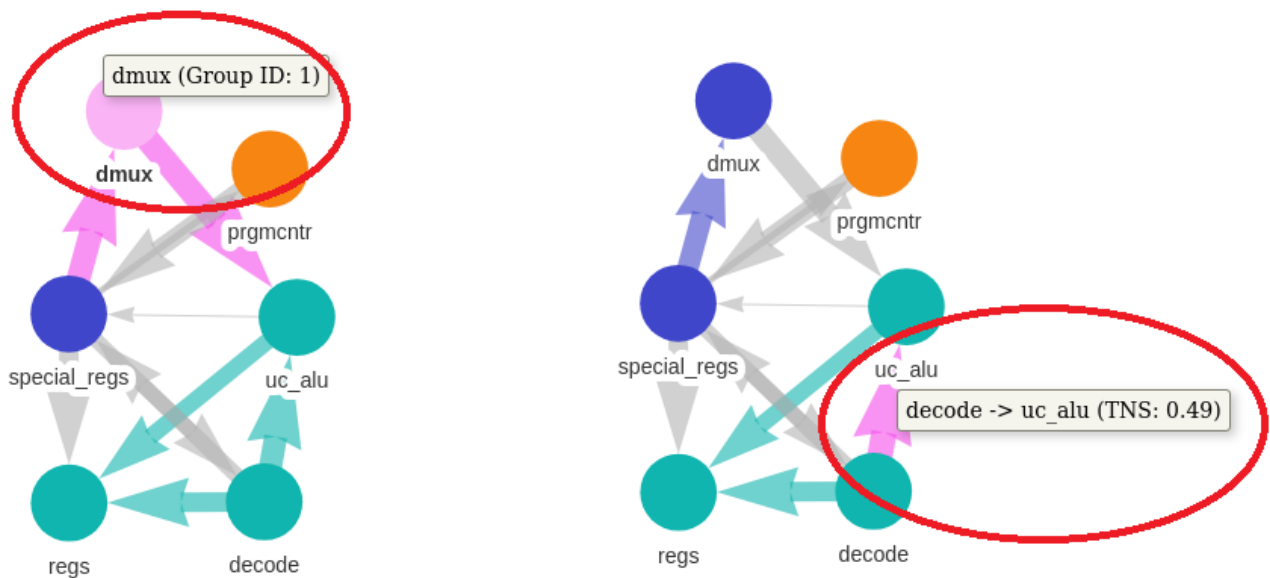
How to read the Graoh

1. Each node represents an instance, and two instances are connected with a directed edge if the source instance is connected to the target instance.
2. A thicker edge means that the timing from the source to the target is worse.
3. Nodes that are highly connected to each other form a group and are labeled with the same color.

Users can adjust the size and font of a node label, as well as the size of a node in the rightmost panel. Nodes can be dragged to adjust the layout of the graph, and can be reset by checking the Physics (Enabled) option. Users can also select multiple nodes by holding the 'Ctrl' key, and drag the selected nodes all at once.



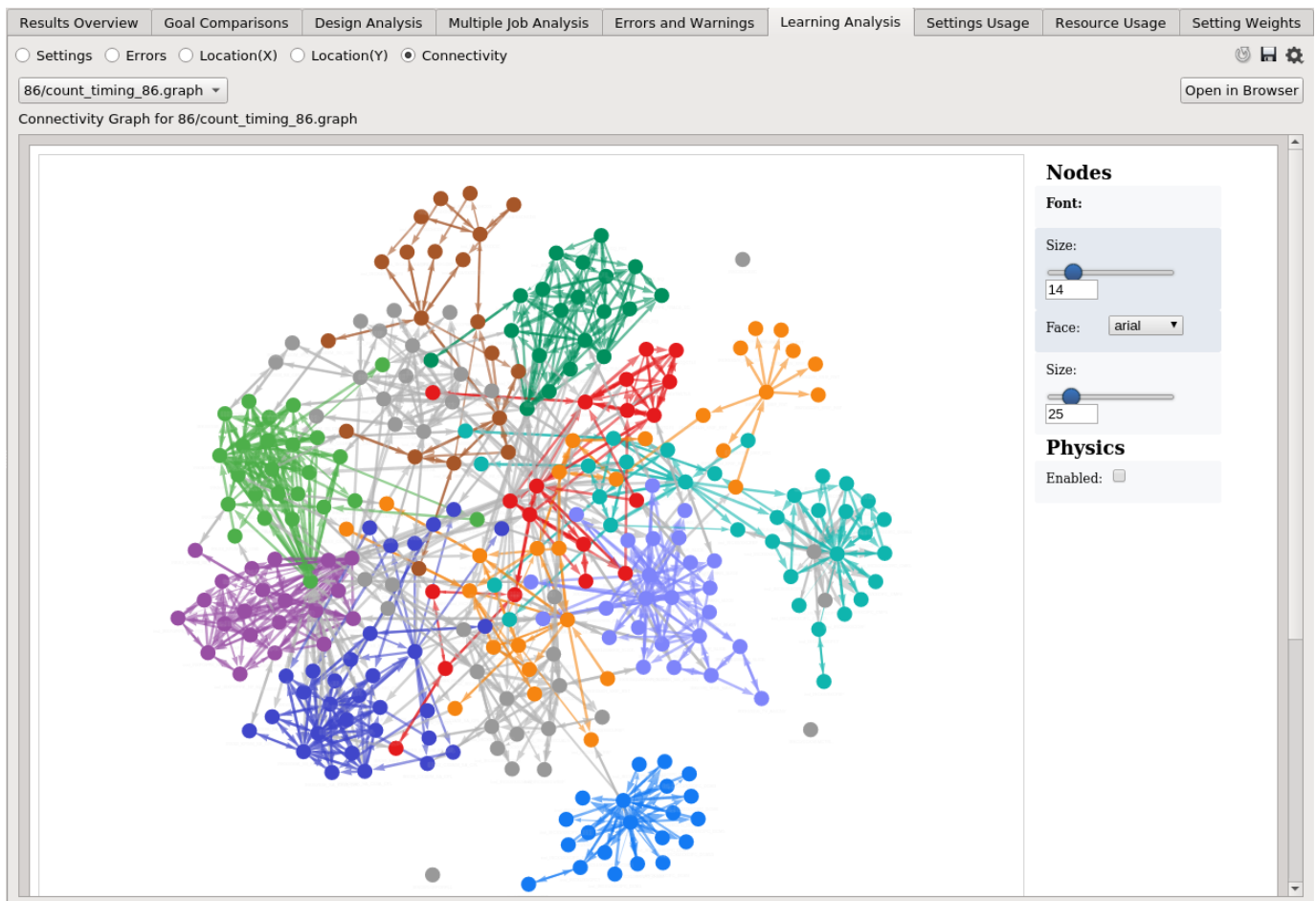
Users can click a node to see which group it belongs to, or click an edge to see the timing from the source to the target.



The table below the graph explains the colors, and the corresponding percentages of the number of nodes in each group.

Connectivity Analysis		
Group ID	Colour	% of Nodes
2		50.0
1		33.33
0		16.67

The screenshot below shows a bigger design with 280 instances containing 1412 connections, and how the instances are connected to one another. Groups of densely-connected instances are labeled with the same color.



29. Resource Usage

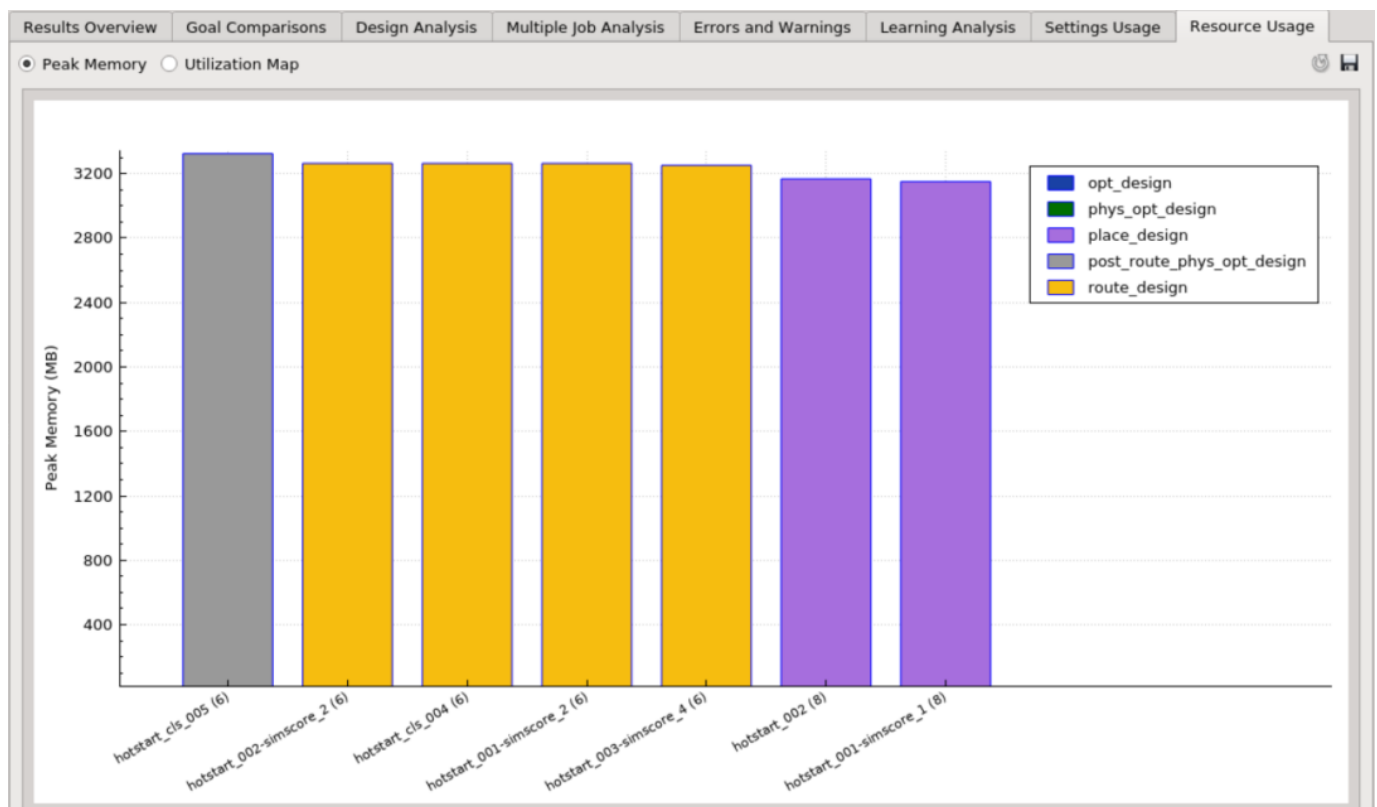
29.1 Peak Memory

Introduction

The Resource Usage (Peak Memory) tab shows the memory usage for every selected strategy.

Peak Memory Chart

The x-axis shows the name of the strategy, and the y-axis shows the peak memory (in MB) used for that strategy. The color shows the step in which the peak memory was consumed.



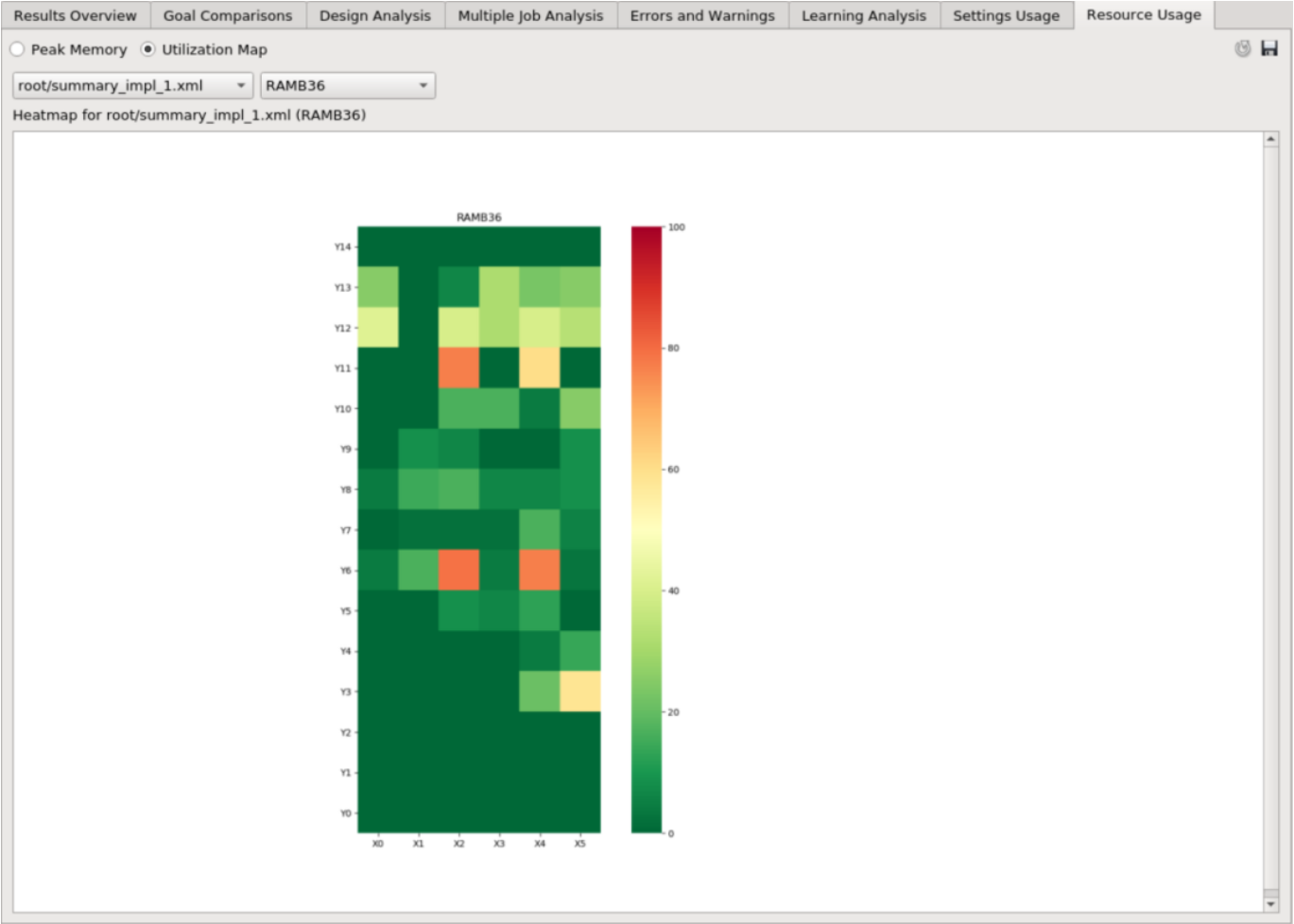
29.2 Utilization Map

Introduction

The Resource Usage (Utilization Map) tab shows the utilization percentage across all the clockregions.

Utilization Heatmap

The cells of this heatmap correspond to the device's clockregions. Cells in green have relatively lower utilization percentages, whereas red cells have relatively higher utilization.



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30. Design Assessment Report

30.1 Early Analysis & Risk Prediction

The Design Assessment's primary goal is to make and report an assessment of the success/failure potential of Placement and Routing of an FPGA design, as well as the potential of meeting timing or not.

Its objectives are:

- Provide users with an early heads-up (post-synthesis and optimization) on the potential impediments to the placement or routing of the FPGA design. This will enable users to adjust the settings, the constraints, or even the RTL.
- Speed up debug and optimization time as well as save compute resources for FPGA designs, especially those that have low potential to successfully place or route.
- Give end-users actionable steps to mitigate the challenges. For instance,
 - review stringent timing constraints,
 - review the flow settings (synthesis, optimization, placement and routing), or
 - adjust Floorplanning constraints to reduce congestion or unbalanced assignment of logic blocks to certain areas of the target device.
- Highlight the root causes of placement, routing or timing failures due to factors like
 - high utilization of specific resources,
 - high intrinsic congestion, artificial congestion due to user constraints, or
 - other insights related to the FPGA design's profile.
- In some cases, the proposed user actions recommend the use of particular recipes in the Plunify toolset.

30.2 How to use

1. Synthesize, Place or Route the FPGA design. The Design Assessment Report provides insights at different stages of compilation.
2. Firstly, analyse the design netlist by executing the following command in the InTime Tcl Console:

```
plunify> results extract root
```

This may take a while.

3. Next, generate the assessment report by entering

```
plunify> results assess_design
```

30.3 Output report

1. For the original project ("Root parent"), the report will be generated as `<project>/plunify.jobs/root/<project name>_design_assessment.rpt`

2. For InTime strategies, the report will be generated as `<project>/plunify.jobs/<job ID>/<strategy name>_design_assessment.rpt`

30.4 Sample Report

The report begins with an overview of the design / project, FPGA tool version and the compilation stage that is analysed;

```
1  -----
2  | Design Assessment Report - <Design / Project file> |
3  -----
4  | |
5  | InTime v3.3.2 (Build e26de52) |
6  | |
7  | Generated on: Fri Mar 29 17:17:51 2022. Time taken: 00:00:06.025 |
8  | Toolchain: <FPGA tool version> |
9  | Device: <Target device part> |
10 | Current Project: <Full path to the design / project file> |
11 | Top level: <Toplevel module name> |
12 | Stage: <Compilation stage: Post-Synthesis / Placement / Route> |
```

... and the types of metrics used to evaluate the design.

```
13 | |
14 | Contents: |
15 | 1. (Post-Route) Logic Utilization Analysis |
16 | 2. (Post-Route) Routing Node Overlaps |
17 | 3. (Post-Route) BRAM / DSP utilization across dies |
18 | 4. (Post-Route) CLB distribution across dies |
19 | 5. (Post-Route) Congestion induced by User Physical Constraints (PBlocks) |
20 | 6. (Post-Route) General Design Attribute Checks |
21 | |
22 | -----
```

The first table contains a quick synopsis of the potential of failure to give the reader an immediate "design score".

```
23 -----
24 | Executive Summary | Risk Level |
25 -----
26 | Risk of Placement Failure | Medium |
27 | Risk of Routing Failure | High |
28 | Risk of Timing Violations | High |
29 -----
```

Subsequent sections present the details, and is usually in the format:

- Data;
- Observations and summarized interpretation of the data; and finally,
- Suggested next steps

```

31  1.1 (Post-Route) Logic Utilization Analysis
32  =====
33  Checks the potential impact of different LUT primitives on design congestion, placement, routing and timing.
34  -----
35  | ID      | Description | Usage   | %      |
36  |-----|
37  | 1.0.1 | Total LUTs | 2004097 | 70.32 |
38  | 1.0.2 | LUT1       | 28863   | 1.44  |
39  | 1.0.3 | LUT2       | 239923  | 11.97 |
40  | 1.0.4 | LUT3       | 357927  | 17.86 |
41  | 1.0.5 | LUT4       | 357902  | 17.86 |
42  | 1.0.6 | LUT5       | 319037  | 15.92 |
43  | 1.0.7 | LUT6       | 700445  | 34.95 |
44  |-----|
45
46  The total LUT utilization of 70.32% is high and may lead to difficulty of placement.
47
48  LUT1% + LUT2% + LUT3% = 31.27% indicates either poor Synthesis/Mapping of RTL coding styles that favor low-input LUT mapping.
49
50  LUT5% + LUT6% = 50.87% indicates a possibility of local congestion in certain blocks of the design and may lead to routing
51  failures.
52
53  Summary:
54      1. Logic (LUT) utilization analysis shows areas of concern for the success of the placement (high Total LUT utilization).
55      2. Sub-optimal Synthesis/Mapping or RTL Coding Style leading to high utilization of LUT1, LUT2 and LUT3.
56
57  Proposed User Actions:
58      1. Please review Synthesis/Mapping to reduce Total LUT usage.
59      2. Run InTime Quick Assessment Recipe.

```

30.5 Using the Report

It is recommended that the reader checks each metric and its suggested action(s), to explore how to resolve the highlighted issues.

31. Creating Tcl Scripts

InTime provides Tcl commands for users to optimize designs via scripts.

31.1 Getting Started - Project Mode

Here is a sample InTime Tcl script.

```
# Sample script for InTime Optimization.
# Adjust the run_target, runs_per_round and round variables according to your recipe
flow reset
flow set run_target local
flow set runs_per_round 40
flow set rounds 1
flow set concurrent_runs 10
flow set control_create_bitstreams false
flow load_recipe "hot_start"
flow run_recipe "hot_start"
```



Run Target for a Server Farm / Grid

If you set up InTime to distribute compilations to a server farm, use "flow set run_target private_cloud" instead.

Assuming you have saved the above as `intimeflow.tcl` To run InTime in commandline mode, execute the following command:

```
<InTime installation dir>/intime.sh -mode batch -platform minimal -project <your DCP/QPF/PRJX/Tcl/XPR file> -vendor_toolchain
<libero/quartusii/quartuspp/vivado> -vendor_toolchain_version <e.g. 20.1.0/2019.1.0> -s intimeflow.tcl
```

Explanation:

```
-mode batch: Run in batch mode
-platform minimal: Run in non-GUI mode
-project: The project to open
-vendor_toolchain: Name of the FPGA tool e.g. vivado
-vendor_toolchain_version: E.g. 2019.1.0
-s <Tcl script>: Tcl script to execute
```

31.2 Getting Started - Non-project mode (Vivado)

Here is a sample project used to demonstrate how to use InTime in non-project mode. The Tcl file is a typical build script which reads in a list of files.

```
#
# Synthesis run script generated by Vivado
#
read_verilog {
  alu.v
  data_mux.v
  ins_decode.v
  ins_rom.v
  io.v
  prgm_cntr.v
  reg_file.v
  spcl_regs.v
  eight_bit_uc.v
```

```
}
read_xdc eight_bit_uc.sdc
```

After that it executes the specified compilation steps. Note that in this case the "top" and "part" variables are specified

```
synth_design -top eight_bit_uc -part xc7k70tfbg484-2

write_checkpoint -force -noxdef eight_bit_uc_synth.dcp

set rc [catch {
    opt_design
    write_checkpoint -force eight_bit_uc_opt.dcp
} RESULT]
if {$rc} {
    return -code error $RESULT
}

...
...
```

To use this build script, save it and treat it like a project file. Assuming you have saved the above project as `nonproj.tcl`, execute the following command:

```
<InTime installation dir>/intime.sh -mode batch -platform minimal -project nonproj.tcl -vendor_toolchain vivado -
vendor_toolchain_version <e.g. 2020.1.0> -s intimeflow.tcl
```

31.3 Checking Results

After running a recipe using the previous examples, the next step is to check the results. Here are sample InTime Tcl commands that retrieve results in various levels of detail.

To see if there was any error:

```
flow recipe errors
```

For a detailed look at the results:

```
# Clear the active results set
results clear
# Add all results of the completed recipe
foreach recipe_job_id [split [flow recipe job_ids] ,] {
    results add job $recipe_job_id
}

# See a quick summary
results summary
# Get the top 10 results in terms of TNS into a list
set resultsList [results summary top10 -list -all_types -metric wns -id]
# Returns a Tcl list like this: "2:hotstart_001" "1:eight_bit_uc_nonproj" "1:placement_1" "2:placement_1"

# Start examining the best result
strategy set_active hotstart_001 2
# Print the TNS
strategy results -field "TNS"
# Print the WNS
strategy results -field "Worst Setup"
# Print the logic utilization
strategy results -field "Area"
```



Retrieve all results of the current project

Use "results add all" to load all the results generated for the current project.

For more sample designs and explanation, please refer to our [github](#).

31.4 Advanced Scripting

To learn how to automate multiple recipes in InTime, refer to this [link](#).

31.5 Tcl Reference

For the full list of Tcl commands, please refer to the [Tcl Reference](#)

32. Using Plunify Cloud

The Plunify cloud platform enables running of strategies using the massive computing power available by the public cloud platform.

32.1 Plunify Credits & Account

The Plunify cloud works on a credit based, pre-paid, pay-per minute model.


A Plunify user account is required in order to use the Plunify cloud. When submitting a Plunify cloud job, InTime will prompt for the user credentials of the account. Once authenticated, the number of credits linked to the account will be checked and if sufficient credits are available for the job, InTime will submit the job. '

For more information on how to buy credits as well as credit pricing, please refer to <https://cloud.plunify.com/>.

32.2 Submit a Plunify Cloud job



Watch Plunify Cloud Video Tutorial

Here is a video tutorial on how to use Plunify Cloud. 

Refer to <https://support.plunify.com/en/documentation/submit-intime-runs-to-plunify-cloud/>

1. To build on the cloud, change the `Run Target` in your Flow Properties to "Plunify Cloud".

Property	Value
Run Target	Plunify Cloud
▼ Number Of Runs	
Runs Per Round	3
Rounds	1
Concurrent Runs	3
➤ Goals	
➤ Parent Revision	
➤ Flow Control	
➤ Strategies	
➤ Clean Generated Strategy Files	
➤ Training Data Filter	

Note

There is no concurrent runs limit on the cloud, whether it is 1 or 100. Always set this to be equal to the number of "Runs Per Round" to get results faster. There is no difference in credits consumed as well.

2. A prompt will appear asking for your credentials

Verify Credentials 2.6.13, 2.6.13 (7f30946)

Please enter your Plunify Cloud credentials.
You will be prompted once for every 2 hours.

Username:

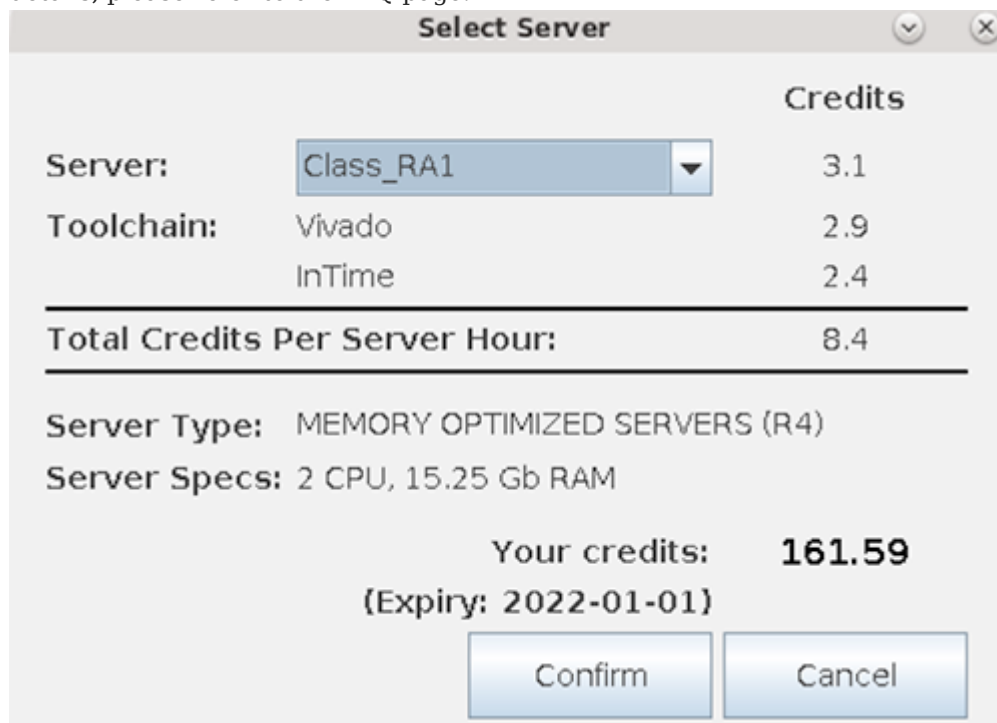
Password:

[Sign up](#) [Forgot password](#)
[If you use LinkedIn for signup](#)

☐ Use proxy

3. After authenticating the credentials, pick a server. Note that different regions offer different type of servers. Different servers will consume different amount of credits due to difference in CPU and RAM. For the full

details, please refer to the FAQ page.



Select Server

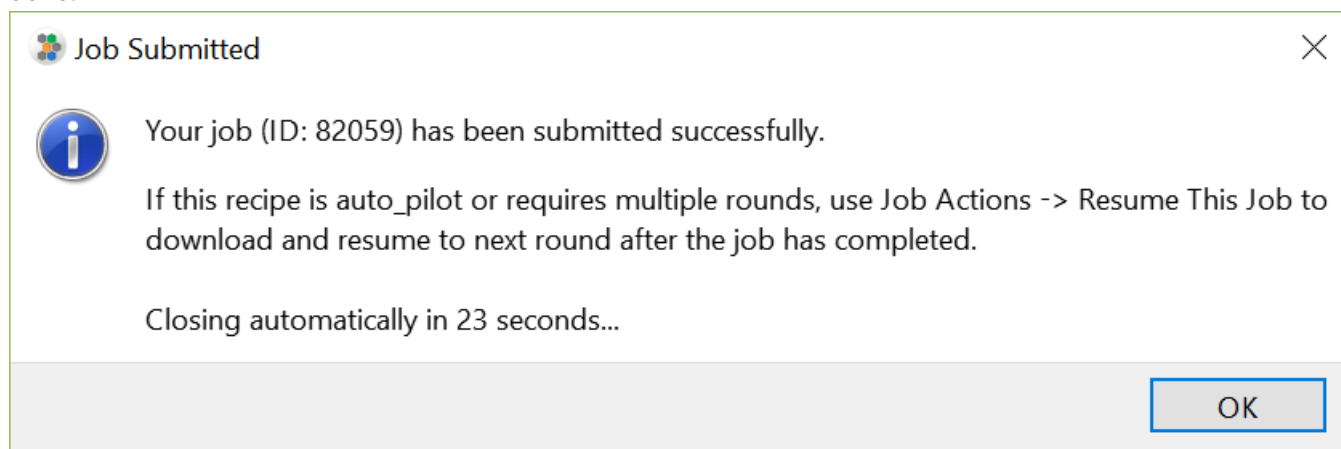
	Credits
Server: Class_RA1	3.1
Toolchain: Vivado	2.9
InTime	2.4
Total Credits Per Server Hour:	8.4

Server Type: MEMORY OPTIMIZED SERVERS (R4)
 Server Specs: 2 CPU, 15.25 Gb RAM

Your credits: **161.59**
 (Expiry: 2022-01-01)

Confirm Cancel

4. InTime will proceed to upload the files to Plunify Cloud. A job ID will be assigned when the uploading is done.



Job Submitted

i Your job (ID: 82059) has been submitted successfully.

If this recipe is auto_pilot or requires multiple rounds, use Job Actions -> Resume This Job to download and resume to next round after the job has completed.

Closing automatically in 23 seconds...

OK

When the job is completed, a notification email will be sent to your email address.

32.3 Check Job Status

To check your job status, just right-click your job and select "Job Actions -> Job Status". Click the magnifying glass icon to see the strategy's compilation log. The refresh rate of the log will depend on the network speed.

History	1: Local Job ID	Job Hash	2: TNS	PP TNS	Worst Slack	Worst Setup	Total Negative Setup Slack	PP Worst Setup	Worst Hold	Tot
▼ eight_bit_uc_nonproj	124	30e08a	-1.027	-0.73	-0.31	-0.310	-1.027	-0.153	0.117	0.0
● hotstart_001-simscore_2		30e08a								
● hotstart_002		30e08a								
▼ eight_bit_uc_nonproj	123	9538aa	-1.027	-0.73	-0.31	-0.310	-1.027	-0.153	0.117	0.0
● hotstart_001-simscore_2										
● hotstart_002										
▼ eight_bit_uc_nonproj	122									
✓ cal_speed_tns_low										
▶ eight_bit_uc_nonproj	121									
▶ eight_bit_uc_nonproj	120									

Job Actions

Resume This Job
Job Status
Cancel Remote Job
Update Active Properties

Stop Current Revision
Requeue Current Revision
Download Remote Results

Job Status					
No.	Strategy	Status	Project	Submitted On	Total Time
1	hotstart_001-simscore_2	SYNTH_DESIGN	/home/betauser/plunify/examples/Vivado/eight_bit_uc_tcl/plunify.jobs/123/eight_bit_uc_nonproj.tcl	2021-11-16 12:01:18 SGT	00:09:54
2	hotstart_002	SYNTH_DESIGN	/home/betauser/plunify/examples/Vivado/eight_bit_uc_tcl/plunify.jobs/123/eight_bit_uc_nonproj.tcl	2021-11-16 12:01:18 SGT	00:09:54

hotstart_001-simscore_2.log (Job 84556)

hotstart_001-simscore_2.log - Live

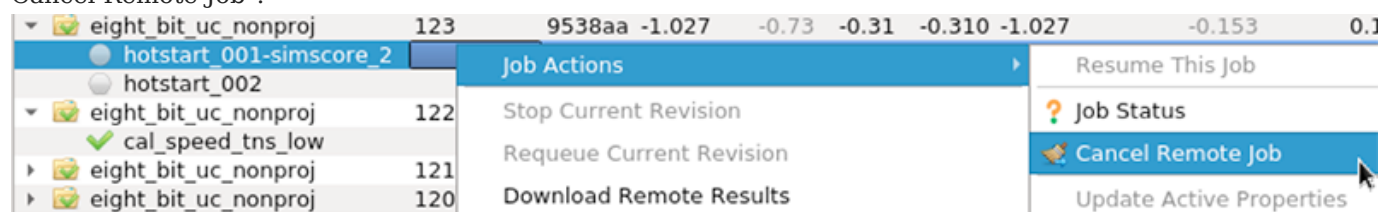
```

25 16 04:07:41 [Info] ] [1] [V] -----
26 16 04:07:41 [Info] ] [1] [V] -----
27 16 04:07:41 [Info] ] [1] [V] Finished Renaming Generated Instances : Time (s): cpu = 00:00:41 ; elapsed = 00:01:28 .
28 16 04:07:41 [Info] ] [1] [V] -----
29 16 04:07:41 [Info] ] [1] [V] 2 |CARRY4 | 3|
30 16 04:07:41 [Info] ] [1] [V] 3 |LUT1 | 2|
31 16 04:07:41 [Info] ] [1] [V] 4 |LUT2 | 7|
32 16 04:07:41 [Info] ] [1] [V] 5 |LUT3 | 19|
33 16 04:07:41 [Info] ] [1] [V] 6 |LUT4 | 28|
34 16 04:07:41 [Info] ] [1] [V] 7 |LUT5 | 26|
35 16 04:07:43 [Info] ] [1] [V] INFO: [Netlist 29-28] Unisim Transformation completed in 0 CPU seconds
36 16 04:07:46 [Info] ] [1] [V] Finished Parsing XDC File [/mnt/data/plunify/plunify/worker_jobs/84556/plunify_026DADA55
37 16 04:07:46 [Info] ] [1] [V] INFO: [Opt 31-138] Pushed 0 inverter(s) to 0 load pin(s).
38 16 04:07:46 [Info] ] [1] [V] Netlist sorting complete. Time (s): cpu = 00:00:00 ; elapsed = 00:00:00 . Memory (MB): p
39 16 04:07:46 [Info] ] [1] [V] INFO: [Project 1-111] Unisim Transformation Summary:
40 16 04:07:46 [Info] ] [1] [V] A total of 32 instances were transformed.
41 16 04:07:46 [Info] ] [1] [V] IOBUF => IOBUF (IBUF, OBUF): 24 instances
42 16 04:07:46 [Info] ] [1] [V] RAM32X1S => RAM32X1S (RAMS32): 8 instances
43 16 04:07:46 [Info] ] [1] [V]
44 16 04:07:46 [Info] ] [1] [V] Synth Design complete, checksum: 45052171
45 16 04:07:46 [Info] ] [1] [V] INFO: [Common 17-83] Releasing license: Synthesis
46 16 04:07:46 [Info] ] [1] [V] 38 Infos, 0 Warnings, 0 Critical Warnings and 0 Errors encountered.
47 16 04:07:46 [Info] ] [1] [V] synth_design completed successfully
48 16 04:07:46 [Info] ] [1] [V] synth_design: Time (s): cpu = 00:00:59 ; elapsed = 00:01:51 . Memory (MB): peak = 2632.6
49 16 04:07:46 [Info] ] [1] [V] INFO: [Common 17-600] The following parameters have non-default value.
50 16 04:07:46 [Info] ] [1] [V] general.maxThreads
51 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) Incrementing command_count for synth_design from 0
52 16 04:07:46 [Info] ] [1] [V] Step completed successfully: synth_design
53 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) 'write_checkpoint' -> '-force -noxdef eight_bit_uc_synth.dcp' (3)
54 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) 1) Remaining arguments: 'eight_bit_uc_synth.dcp'
55 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) Removed eight_bit_uc_synth.dcp, leaving ''
56 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) Output file mappings:
57 16 04:07:46 [Info] ] [1] [V] a_output_files(eight_bit_uc_synth.dcp) = /mnt/data/plunify/plunify/worker_jobs/84556/plu
58 16 04:07:46 [Info] ] [1] [V] INFO: (nonproj) Command: write_checkpoint -noxdef -force eight_bit_uc_synth.dcp
59 16 04:07:47 [Info] ] [1] [V] INFO: [Timing 38-480] Writing timing data to binary archive.
60 16 04:07:47 [Info] ] [1] [V] INFO: [Common 17-1381] The checkpoint '/mnt/data/plunify/plunify/worker_jobs/84556/plu
61 16 04:07:47 [Info] ] [1] [V] INFO: (nonproj) Processing 'opt_design'
62 16 04:07:47 [Info] ] [1] [V] INFO: (nonproj) 'opt_design' -> '-directive Explore' (2)
63 16 04:07:47 [Info] ] [1] [V] INFO: (::intime::vivado::run_clk_explore) No clock exploration settings to apply.
64 16 04:07:47 [Info] ] [1] [V] INFO: (nonproj) Not adjusting PBlock.
65 16 04:07:47 [Info] ] [1] [V] INFO: (nonproj) Command: opt_design -directive RuntimeOptimized
66 16 04:07:47 [Info] ] [1] [V] Current action: opt_design
67 16 04:07:47 [Info] ] [1] [V] Current action: opt_design
68 16 04:07:47 [Info] ] [1] [V] Command: _opt_design -directive RuntimeOptimized
69 16 04:07:47 [Info] ] [1] [V] INFO: [Vivado_Tcl 4-136] Directive used for opt_design is: RuntimeOptimized
70

```

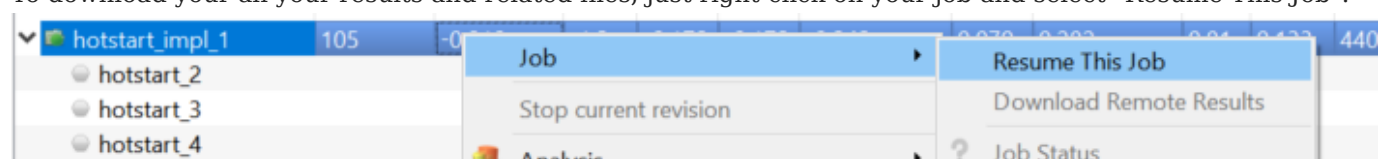
32.4 Cancel Job

To cancel a job after being submitted to Plunify Cloud, just right-click your job and select "Job Actions -> Cancel Remote Job".



32.5 Download All Results

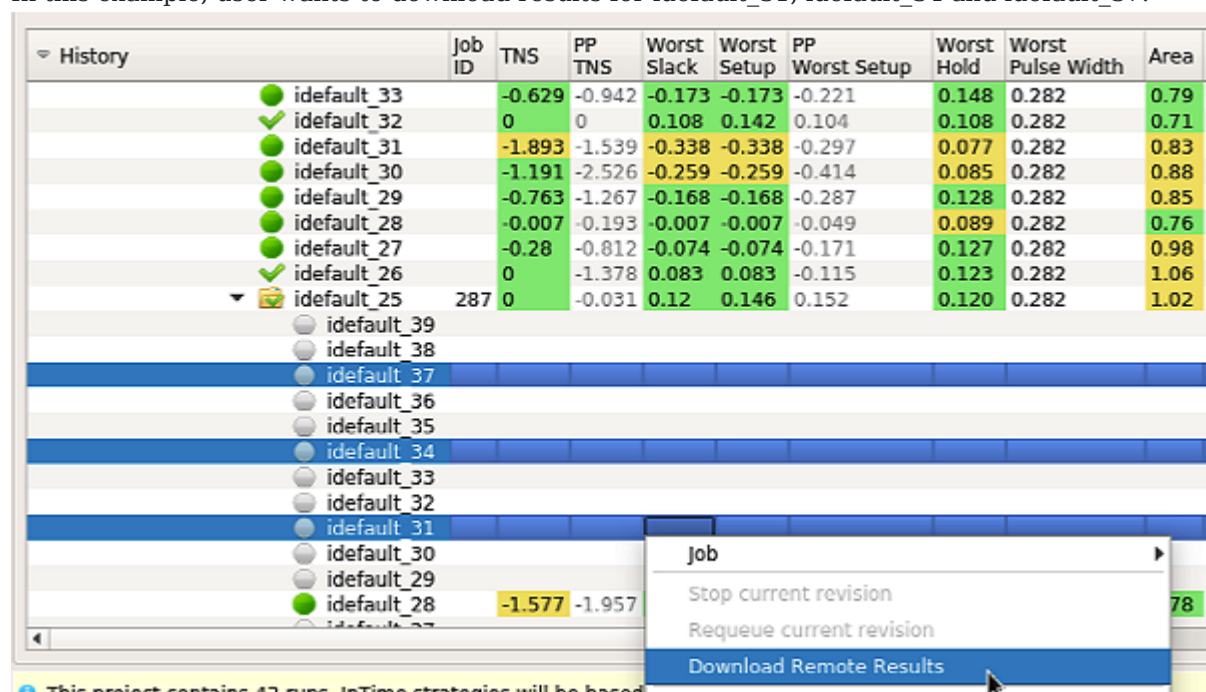
To download your all your results and related files, just right-click on your job and select "Resume This Job".



32.6 Download Selective Results

To download results selectively, select on the strategies with "Ctrl" key pressed and right click "Download Remote Results".

In this example, user wants to download results for idefault_31, idefault_34 and idefault_37.



A new window will appear and prompt you for the type of files to download.

The following results will be downloaded. Proceed?

	Strategy	Run Target	Remote Job ID	Required Files	<input checked="" type="checkbox"/> Results File	<input checked="" type="checkbox"/> Project File	<input type="checkbox"/> Bit File
1	idefault_31	Private Cloud	196	<input checked="" type="checkbox"/> 31.80 KB	<input checked="" type="checkbox"/> 58.73 KB	<input type="checkbox"/> 293.12 KB	<input type="checkbox"/>
2	idefault_34	Private Cloud	196	<input checked="" type="checkbox"/> 23.67 KB	<input checked="" type="checkbox"/> 24.40 KB	<input type="checkbox"/> 168.88 KB	<input type="checkbox"/>
3	idefault_37	Private Cloud	196	<input checked="" type="checkbox"/> 31.56 KB	<input checked="" type="checkbox"/> 58.05 KB	<input type="checkbox"/> 306.94 KB	<input type="checkbox"/>

Total download size: 228.20 KB

☒ Overwrite existing files and results

OK Cancel

There are 3 types of files:

- Results File - Strategy logs of the builds
- Project File - Netlist/DCP type files, generated by the build
- Bit File - Bitstream file

Download required files first

As DCP and bit files are often much larger in filesize, it is recommended that the "Required Files" are downloaded first. These files are much smaller and thus download is much faster. After downloading, the results will be updated in InTime to reflect the TNS, WNS values of the strategies. You can do the exact same steps again to selective download the "Project File" and "Bit File", which will take a longer time to download due to its filesize.

If there are existing results, select the "Overwrite existing files and results" checkbox, before clicking download.

33. Creating Auto Pilot Templates

An Auto Pilot template is a JSON file that describes a sequence of optimization steps.

Each template starts with a root object named "cookbook", followed by a "recipe" step. Each recipe step describes the recipe type, build flow properties, as well as criteria for selecting the next step. All templates must be placed in the folder `<user_home>/plunify/auto_pilot_templates/`.

Below is an example.

```
{
  "cookbook": [
    {
      "id": "1",
      "name": "InTime Default",
      "recipe_name": "intime_default",
      "flow": {
        "run_target": "local",
        "strategy_max_runtime": "12",
        "runs_per_round": "5",
        "rounds": "1",
        "concurrent_runs": "1",
        "goal": "speed_tns",
        "goal_based_target": "0",
        "control_stop_when_goal_met": "false"
      },
      "decisions": [
        {
          "next_recipe_id": "3",
          "criteria": "TNS < -79.72"
        },
        {
          "next_recipe_id": "2",
          "criteria": "WNS < -0.27"
        }
      ],
      "max_same_recipe_attempts": "99",
      "max_retry_if_fail": "10"
    },
    ...
  ],
  "recipe_start_id": "1"
}
```

33.1 Key Components

There are 3 parts to each recipe step.

1. **Basic descriptors** such as recipe ID, name and number of retries.
2. **Flow properties** which describes the maximum runtime, rounds, goals etc, of the recipe.
3. **Decisions** are how Auto Pilot determines the next recipe to execute, based on user-defined criteria.

Basic Descriptors

Name	Value description
id	The unique numeric identifier for the recipe.
name	Name of this step/recipe.
recipe_name	Alias for the recipe - refer to page.
match_max_count	Maximum number of results to add to the queue when a condition is met.
max_same_recipe_attempts	Maximum number of times the same recipe will run.
max_retry_if_fail	Maximum number of times to retry the recipe if it fails.
recipe_start_id	The ID of the first recipe to run in this template.

Flow Properties

Auto Pilot supports a subset of InTime flow properties. Refer to the flow properties page for a full property description.

Name	Sample Value	Description
concurrent_runs	2	Limited by your InTime license and the number of CPU cores available.
control_stop_when_goal_met	false	As opposed to "true", which stops the current recipe if the goal is met.
goal	speed_tns	Other available goals: "area".
goal_based_target	0	Expressed in nanoseconds (ns), can be a negative number.
rounds	1	This will be ignored for some recipes where the default is 1, e.g. placement.
runs_per_round	5	Customizable but will be automatically limited to the default recipe maximum.
run_target	local	Other options are "private_cloud" or "plunify_cloud".
strategy_max_runtime	12	Up to 48 hours.
strategy_reuse_multiplier	0.5	Percentage of good results from Machine Learning to include (none=0, max=1.0).
strategy_use_all_training_data	false	Reuse all results in the database (even those from other designs).

Note

Note that *rounds* applies only if it does not conflict with the pre-defined limit of that recipe. For example, if "3" rounds is specified for Placement Exploration, it will be ignored as this recipe only has 1 round.

Decisions

Auto Pilot automatically jumps to different recipe steps based on the criteria.

next_recipe_id

Specify the next recipe step to execute. "ID" and "step" must be defined as well.

Criteria

Specify the criteria and comparison operators.

For example, the snippet below says that if the TNS of this round is less than -80ns, then jump to recipe ID 3.

```
"decisions": [  
  {  
    "next_recipe_id": "3",  
    "criteria": "TNS < -80"  
  },  
]
```

Supported Criteria:

Criteria	Description
"Area"	Logic Utilization (%)
"FEP"	Number of Failing Setup Endpoints
"Power"	Power Estimate (W)
"TNS"	Total Negative Slack (ns)
"WNS"	Worst Negative Slack (ns)
"parentArea"	Parent revision's Logic Utilization (%)
"parentFEP"	Parent revision's number of Failing Setup Endpoints
"parentPower"	Parent revision's Power Estimate (W)
"parentTNS"	Parent revision's Total Negative Slack (ns)
"parentWNS"	Parent revision's Worst Negative Slack (ns)
"bestArea"	Best revision's Logic Utilization (%)
"bestFEP"	Best revision's number of Failing Setup Endpoints
"bestPower"	Best revision's Power Estimate (W)
"bestTNS"	Best revision's Total Negative Slack (ns)
"bestWNS"	Best revision's Worst Negative Slack (ns)
"deltaParentArea"	(Current revision - Parent revision): Difference in Logic Utilization (%)
"deltaParentFEP"	(Current revision - Parent revision): Difference in the number of Failing Setup Endpoints
"deltaParentPower"	(Current revision - Parent revision): Difference in the Power Estimate (W)
"deltaParentTNS"	(Current revision - Parent revision): Difference in Total Negative Slack (ns)
"deltaParentWNS"	(Current revision - Parent revision): Difference in Worst Negative Slack (ns)
"deltaBestArea"	(Current revision - Best revision): Difference in Logic Utilization (%)
"deltaBestFEP"	(Current revision - Best revision): Difference in the number of Failing Setup Endpoints
"deltaBestPower"	(Current revision - Best revision): Difference in the Power Estimate (W)
"deltaBestTNS"	(Current revision - Best revision): Difference in Total Negative Slack (ns)
"deltaBestWNS"	(Current revision - Best revision): Difference in Worst Negative Slack (ns)
"pctDeltaParentArea"	(Current revision - Parent revision) / Parent revision: Percentage difference in Logic Utilization (%)
"pctDeltaParentFEP"	(Current revision - Parent revision) / Parent revision: Percentage difference in the number of Failing Setup Endpoints (%)
"pctDeltaParentPower"	(Current revision - Parent revision) / Parent revision: Percentage difference in the Power Estimate (%)
"pctDeltaParentTNS"	(Current revision - Parent revision) / Parent revision: Percentage difference in Total Negative Slack (%)
"pctDeltaParentWNS"	(Current revision - Parent revision) / Parent revision: Percentage difference in Worst Negative Slack (%)
"pctDeltaBestArea"	(Current revision - Best revision) / Best revision: Percentage difference in Logic Utilization (%)
"pctDeltaBestFEP"	(Current revision - Best revision) / Best revision: Percentage difference in the number of Failing Setup Endpoints (%)

Criteria	Description
"pctDeltaBestPower"	(Current revision - Best revision) / Best revision: Percentage difference in the Power Estimate (%)
"pctDeltaBestTNS"	(Current revision - Best revision) / Best revision: Percentage difference in Total Negative Slack (%)
"pctDeltaBestWNS"	(Current revision - Best revision) / Best revision: Percentage difference in Worst Negative Slack (%)

Supported Comparison Operators:

Operator	Description
>	Greater Than
>=	Greater Than or Equal To
<	Smaller Than
<=	Smaller Than or Equal To
==	Equal To
!=	Not Equal To

33.2 Rules

1. Each template has a mandatory field called "recipe_start_id", which tells InTime which recipe step to start first.
2. If there are multiple rounds in a single recipe step, it will complete the rounds before evaluating a decision/criteria.
3. In the event where no decision is specified, Auto pilot will select the next available recipe step in the queue. (If a recipe step does not have a "decisions" section, Auto Pilot will terminate after the recipe step is completed.)
4. If there are multiple criteria, for each criteria that is met, the corresponding recipe step is inserted into a FIFO queue.
5. If multiple criteria are met, Auto Pilot will prioritize other recipe steps if a recipe step has been executed previously.
6. In the event that the current round's results are not better than that of the parent round, Auto Pilot will use the parent round's best result as the parent revision.

33.3 Built-in Templates

Several templates are included to get you started quickly, and are automatically copied to `<user> home>/ .plunify/auto_pilot_templates/` when you launch InTime.

Naming convention: <template number>_<toolchain name>_<1st recipe>..._<Nth recipe>.json

Name	Supported Toolchain	Run Target	Description
2001_lib_def_reg_pla.json	Libero	Local	InTime Default -> Region Exploration or Placement Exploration
2002_lib_def_reg_pla.json	Libero	Private Cloud	InTime Default -> Region Exploration or Placement Exploration
5001_viv_hot_ext_pla_def.json	Vivado	Local	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default
5002_viv_hot_ext_pla_def.json	Vivado	Private Cloud	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default
5011_viv_hot_ext_pla_def.json	Vivado	Local	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default with multiple criteria
5012_viv_hot_ext_pla_def.json	Vivado	Private Cloud	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default with multiple criteria
5021_viv_hot_ext_pla_def.json	Vivado	Local	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default with multiple criteria
5022_viv_hot_ext_pla_def.json	Vivado	Private Cloud	Hot Start -> Extra Opt Exploration or Placement Exploration or InTime Default with multiple criteria
5031_qua_def_see.json	Quartus	Local	InTime Default -> Seeded Effort Level Exploration
5032_qua_def_see.json	Quartus	Private Cloud	InTime Default -> Seeded Effort Level Exploration
5031_viv_def_ext.json	Vivado	Local	InTime Default -> Extra Opt Exploration
5031_viv_def_ext.json	Vivado	Private Cloud	InTime Default -> Extra Opt Exploration

Happy template crafting!

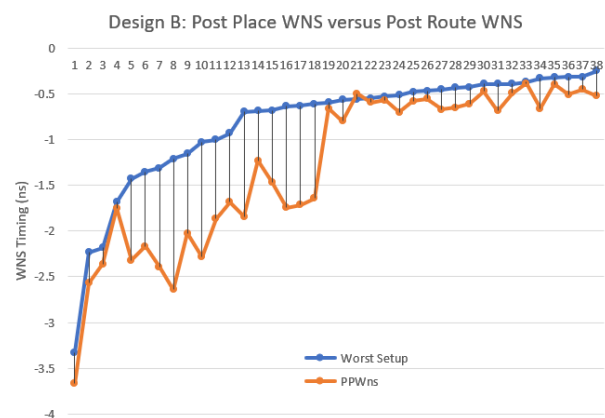
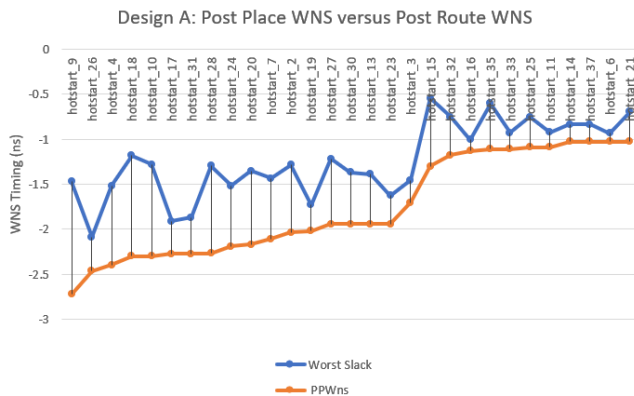
34. Reduce Run Time with Post Placement Estimates

Vivado provides post placement estimates for TNS and WNS. InTime tracks these estimate values as part of the builds. Users can make use of this feature, to set a cut off point and abandon builds with poor results and thus save time.

(For more information about timing estimates, please refer to this post.)

34.1 Understanding Timing Estimates

Vivado reports the estimated timing summary as it went from synthesis to routing. The general rule of thumb is that it gets more accurate as it approaches routing (and less accurate the earlier it is). InTime identifies the post placement estimate, as the optimal point between accuracy and run time. In the chart below, the correlation between post placement estimate and the final timing after route for 2 different design is very high.



34.2 Where to find the estimates in InTime

InTime will display these values as "PPTNS" (Post Placement TNS) and "PPWNS" (Post Placement WNS). These numbers are shown in the results history panel.

History	1: Job ID	Change	2: TNS	PP TNS	Worst Slack	Worst Setup	PP Worst Setup	Worst Hold	Worst Pulse Width
hotstart_impl_1	97		-0.919	-1.365	-0.172	-0.172	-0.242	0.079	0.282
cal_speed_tns_low_2		-0.17	-1.089	-0.879	-0.152	-0.152	-0.185	0.041	0.282

By observing the values versus the final TNS or Slack timing, user can tell what is a good cut off point to abandon builds.

34.3 Controlling the cut off point

The cut-off point can be configured in Flow Properties under "Flow Control".

Property	Value
Run Target	Plunify Cloud
> Number Of Runs	
> Goals	
> Parent Revision	
✓ Flow Control	
Stop If Post-Place Timing Is Bad	<input checked="" type="checkbox"/>
- Post-Place TNS Limit(ns)	-0.90
- Post-Place Worst Setup Slack Limit(ns)	-0.20
- Post-Place Worst Hold Slack Limit(ns)	-0.30
Force Continue	<input type="checkbox"/>
Create Bitstreams	<input type="checkbox"/>
Reuse Synthesis Results	<input type="checkbox"/>
Reuse Routed Netlist	<input type="checkbox"/>
Allow Eval IP	<input type="checkbox"/>
Ignore DRC Errors	<input type="checkbox"/>
Regenerate IP Targets	<input type="checkbox"/>
> Strategies	
> Clean Generated Strategy Files	
> Training Data Filter	

Note that if any of the conditions are met for TNS, Worst Setup Slack **or** Worst Hold Slack, the build will be stopped.

The final result will show that the PPTNS and TNS are the same, and will be shown in a grey colour.

35. How to use custom strategies

Custom Strategies are strategies that are generated from external sources which can be run in InTime. Note that this feature is only available from 1.3.2 onwards.

35.1 Prepare Strategy File

The strategy file needs to be in JSON format, as shown in the example below:

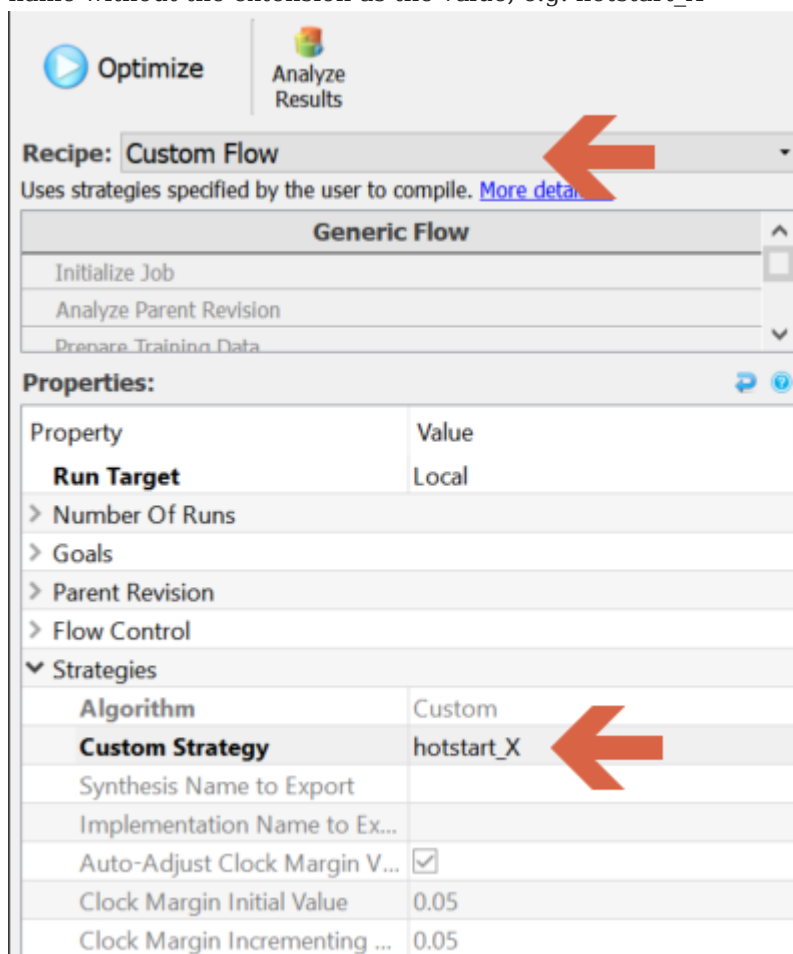
```
{
  "custom_1": [
    { "name": "ALM_REGISTER_PACKING_EFFORT", "step": "unknown", "value": "HIGH" },
    { "name": "FITTER_AGGRESSIVE_ROUTABILITY_OPTIMIZATION", "step": "unknown", "value": "ALWAYS" },
    { "name": "OPTIMIZATION_MODE", "step": "unknown", "value": "HIGH POWER EFFORT" },
    { "name": "OPTIMIZATION_TECHNIQUE", "step": "unknown", "value": "BALANCED" },
    { "name": "PHYSICAL_SYNTHESIS_COMBO_LOGIC", "step": "unknown", "value": "OFF" },
    { "name": "PHYSICAL_SYNTHESIS_COMBO_LOGIC_FOR_AREA", "step": "unknown", "value": "OFF" },
    { "name": "PHYSICAL_SYNTHESIS_REGISTER_DUPLICATION", "step": "unknown", "value": "OFF" },
    { "name": "PHYSICAL_SYNTHESIS_REGISTER_RETIMING", "step": "unknown", "value": "OFF" },
    { "name": "QII_AUTO_PACKED_REGISTERS", "step": "unknown", "value": "OFF" },
    { "name": "ROUTER_LCELL_INSERTION_AND_LOGIC_DUPLICATION", "step": "unknown", "value": "OFF" }
  ]
}
```

The example shows the strategy settings for a Quartus tool. "custom_1" is the strategy name. The settings are expressed in a "name", "step" and "value" format. The "name" should be a valid setting name and the "value" is the acceptable value for the setting. "Step" can be left as "unknown".

35.2 Run a Custom Strategy

1. To run a custom strategy, switch to the "Custom Flow" recipe
2. Prepare your strategy file in the above format. In this example we named it "hotstart_X.strategy".
3. Copy the strategy file into the project directory at the same level as the project file, i.e. XPR, DCP, QPF

4. In the "Flow Properties", there is a "Custom Strategy" field under the "Strategies" group. Specify the file name without the extension as the value, e.g. hotstart_X



Optimize Analyze Results

Recipe: Custom Flow

Uses strategies specified by the user to compile. [More details](#)

Generic Flow

- Initialize Job
- Analyze Parent Revision
- Prepare Training Data

Properties:

Property	Value
Run Target	Local
> Number Of Runs	
> Goals	
> Parent Revision	
> Flow Control	
▼ Strategies	
Algorithm	Custom
Custom Strategy	hotstart_X
Synthesis Name to Export	
Implementation Name to Ex...	
Auto-Adjust Clock Margin V...	<input checked="" type="checkbox"/>
Clock Margin Initial Value	0.05
Clock Margin Incrementing ...	0.05

5. Click "Optimize". InTime will generate and run the strategies that you defined in your strategy file.

36. Using Hook Scripts

Overview

InTime supports customized recipe hook scripts for Vivado and InTime. These allows user specific .tcl scripts and commands to be executed when running existing InTime recipes.

36.1 Recipe hook scripts

Two types of hook scripts exist:

- **Recipe Initialization** (`initialize_recipe.tcl`) : This .tcl script is sourced before the recipe is started.
- **Recipe Finalization** (`finalize_recipe.tcl`) : This .tcl script is sourced after the recipe completed. Note that the script is always sourced, even if the recipe failed or was stopped.

Hook script files are searched for in the following paths:

- **Global:** Global hook scripts executed for all users located in `<user_home>/ .plunify .`
- **User Specific:** User specific hook scripts, only executed for the current user located in `<user_home>/ .plunify/<username>_<mac> .`

The hook scripts have access to the full InTime tcl command set, allowing them to be very flexible.

Example: Send email notification when a recipe completes

To demonstrate the usefulness of these hook scripts, consider the following example recipe finalization script in `finalize_recipe.tcl` which sends an email notification when the recipe completes on an Linux system for which `sendmail` was configured correctly.

```
# The email header:
set msg "From: intime@localhost"
append msg \n "To: your_email@your_company.com"
append msg \n "Subject: InTime Recipe Completed ([project info name])"

# Add results of last recipe to the active result set:
results clear
results add job [flow get recipe_root_local_job_id] local -r

# The email body:
if {[info exists recipe_outcome]==1} {
    append msg \n\n "Your InTime recipe completed: $recipe_outcome."
} else {
    append msg \n\n "Your InTime recipe completed."
}
append msg \n\n "[results summary]"

# Send the email using sendmail:
exec /usr/lib/sendmail -oi -t << $msg
```

36.2 Vivado hook scripts

From InTime 2.6.11 onwards, InTime supports 2 types of hook scripts. These hook scripts are required to be placed in the `<user_home>/plunify/intime_vivado_hook/` folder. You can use these hook scripts to configure Vivado specific parameters like *maxthreads*

Filename	When is it read
intime_vivado_pre_proj.tcl	InTime will source this file before opening the project.
intime_vivado_post_proj.tcl	InTime will source this file after the project is opened.

37. Debugging InTime Issues and Errors

37.1 Determine where the error or issue is happening

1. During startup and before the FPGA tools start?
Refer to Session log (and/or Agent Log)
2. Happens when the FPGA tools are running? Is it an FPGA toolchain error?
Refer to Strategy log (and/or Agent Log)
3. After the FPGA tools have completed?
Refer to Session log (and/or Agent Log)

37.2 InTime Logging File Types

Different log files are used to keep track of what is happening. To debug an InTime error or unexpected event, here are the main log files

Log Name	Description
Session Log	The main InTime log. Stores the details of the job flow, from start to end. It excludes any build information for each strategy.
Strategy Log	Also referred to as the "revision log", it logs information of each FPGA tool process during its compilation.
InTime Server Log	Information on the InTime Server. All interaction with the server is saved here.
Agent Log	Only for private cloud. InTime agent is responsible for running an InTime worker.
Job Log	Typically named as <code>job_<jobID>.log</code> , this is a subset of the session log. It only contains information for that particular job ID.

Since InTime operates as a wrapper around the FPGA tools, if an error happens within the FPGA tool, InTime will exit as well.

Locating Log Files

An easy way to locate the log files is to use the menu option with the InTime GUI. Right-click on any result, and choose "Manage Logs", then "More Options".

The screenshot shows the InTime GUI with a right-click context menu open over a job result. The menu includes options like 'Job', 'Stop current revision', 'Request current revision', 'Download Remote Results', 'Analysis', 'Export', 'Restore', 'Remove From Project History', 'Set As Parent Revision', 'Unset Parent Revision', 'Tag Result', 'Mark For Rerun', 'Manage Logs', 'Open Strategy Log', and 'More Options'. The 'More Options' button is highlighted with a yellow background and an arrow pointing to the 'Manage Logs' dialog box.

The 'Manage Logs' dialog box displays a table of log files:

File Name	File Type	File Path
intime.log	Session Log	/home/dev2002/.plunify/dev2002_525400E0F8E1/log/intime.log
intime.dmp	Dump File	/mnt/disk/.plunify/dev2002_525400E0F8E1/intime.dmp
job_145.log	Job Log	/home/dev2002/plunify/examples/vivado/eight_bit_uc_xpr/plunify.jobs/145/job_145.log
impl_1.log	Strategy Log	/home/dev2002/plunify/examples/vivado/eight_bit_uc_xpr/plunify.jobs/145/impl_1.log
placement_1.log	Strategy Log	/home/dev2002/plunify/examples/vivado/eight_bit_uc_xpr/plunify.jobs/145/placement_1.log
placement_1_dev2002_525400E0F8E1_agent.log	Agent Log	/home/dev2002/plunify/examples/vivado/eight_bit_uc_xpr/plunify.jobs/145/placement_1_dev2002_525400E0F8E1_agent.log

Session log

When InTime is running, a brief version of the log can be seen in the window below. Typically if there are any errors, it will be shown in the session log window. Red means there is an error and orange is just a warning.

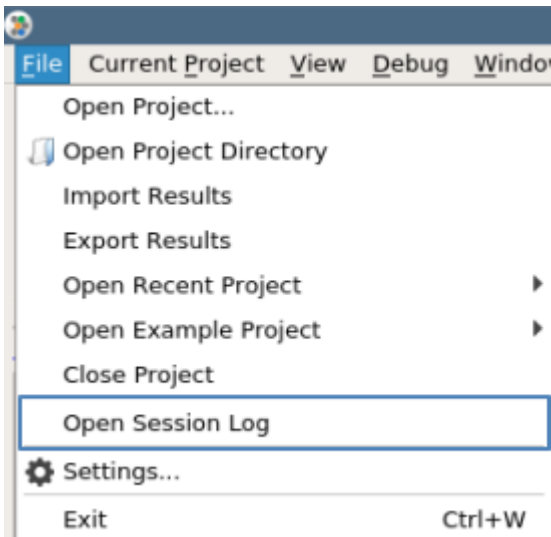
The screenshot shows the InTime GUI with the 'Session Log' window open. The log displays various messages, including errors and warnings, with timestamps and status indicators. The messages are as follows:

```

4459 25 17:58:37 [Info] [1] To view the current flow configuration, type "flow properties"
4468 25 18:01:28 [Error] [1] No strategy is currently set as the active strategy. Set a strategy as active using the set_active command.
4461 25 18:01:28 [Error] [1] For example: "strategy set active cal_speed_low 100"
4462 25 18:01:51 [Error] [1] invalid command name "starategy"
4463 25 18:01:51 [Info] [1] * * * : starategy Task Started. This may take a while.
4464 25 18:01:56 [Info] [1] Successfully set strategy for revision "cal_speed_tns_low" in job "152" as the active strategy.
4465 25 18:02:06 [Error] [1] Invalid export information specified: ". Possible levels are <-results_csv,-script_tcl,-summary_xml,-locklist_template_json>.
4466 25 18:02:18 [Error] [1] Invalid export information specified: ". Possible levels are <-results_csv,-script_tcl,-summary_xml,-locklist_template_json>.
4467 25 18:02:28 [Error] [1] Invalid export information specified: ". Possible levels are <-results_csv,-script_tcl,-summary_xml,-locklist_template_json>.
4468 25 18:03:02 [Error] [1] Invalid export information specified: ". Possible levels are <-results_csv,-script_tcl,-summary_xml,-locklist_template_json>.
4469 25 18:03:25 [Warning] [1] Unable to find post_placement field under timing analysis node.
4470 25 18:03:30 [Info] [1] (v) strategy: cal_speed_tns_low 152
4471 25 18:03:30 [Info] [1] (v) strategy: c10_default 152
4472 25 18:03:35 [Info] [1] (v) Applying device and toolchain version setting filters:
4473 25 18:03:35 [Info] [1] (v) -> Toolchain version: 19.1.0pro
  
```

The bottom of the window shows tabs for 'Session Log', 'Issues', 'Selected Results', 'Tcl Console', and 'Private Cloud Console'.

Unless you are using InTime with a custom_session_path argument, the full session log is typically located at `/home/<username>/.plunify/<username>_<mac>/log/intime.log`.



Another way to view the session log, is to click on *File -> Open Session Log*. The system's default text editor should open the file automatically, unless the system does not have a text editor configured or installed.

Important

The session log may be refreshed or cleared, e.g. when you open a new project etc. The old log file will be renamed as `intime_<date stamp>.log`.

Strategy Log

Strategy log (or sometimes referred to as the 'Revision log') contains information about each compilation and the vendor toolchain. If an error happens in the FPGA tool, the errors will be located in this log. The log file is normally located at `<project directory>/plunify.job/<jobid>/<strategy name>.log`

Click on a revision, right-click and select 'Open Strategy Log File'. The system default text editor should open the file automatically.

[illegible]

InTime Server log (Private Cloud only)

The InTime Server Log contains information on the InTime Server process. It is located in `<InTime Server installation directory>/logs/intimeserver.log`.

Agent Log (Private Cloud only)

In a private cloud setup, an agent is responsible for running an InTime worker. Typically it handles download and uploading of files as well and job monitoring. This log is transferred back to the InTime client when the job is polling or when the job is done. This log is located in the same folder as the strategy log. Its filename will have a `_agent` suffix appended to it.

37.3 How to ignore or relegate an error to a warning?

It may be necessary to ignore a particular error message or relegate an error to a warning during the compilation. For example, the FPGA tools will often flag timing loops as an error. To do so in InTime, you can create a json file to tell InTime to ignore certain messages.

Steps: 1. In the ".plunify" folder found under `/home/<username>/ .plunify/` , create a text file called `regex_ignore_list.txt` . (If you are using a "-custom_session_path" argument when starting InTime, look for the ".plunify" folder in that location.)

1. Use regular expressions to specify the error message you want to catch. For example, type in `To Error\s+:\s+This\s+design\s+contains\s+\d+\s+timing\s+loops` in the `regex_ignore_list.txt` file.

2. Save and Restart InTime

This will relegate all instances of this error into a warning.

38. Private Cloud / InTime Server Administration Commands

The InTime Server console allows the user to view the current status of any InTime job. It also has useful commands to query the InTime Server.

There are two modes; In user mode, the command prompt is displayed as `user>`. In admin mode, the command prompt is displayed as `admin>`. When in user mode, the user has limited rights to access information on workers and jobs. When a user goes into admin mode by using `.admin`, the user can perform tasks like setting up the global toolchain, cancel jobs and more.

There are 2 ways to execute these commands. First is the Admin Console. The InTime Server only allows localhost for admin access by default. The user has to start InTime Server with an additional argument to make admin mode available to all users. Second is the Private Cloud Console in the GUI. Refer to the Private Cloud Console page on how to enable it.

To list all the commands, use `.help` in the console. To exit the console, enter the `.exit` command.

```
user> .help
+-----+-----+-----+
| COMMANDS | MODE | DESCRIPTION |
+-----+-----+-----+
| .help    | user | show list of commands for user mode |
| .whoami  | user | show current login user |
| .admin   | user | enter admin mode |
| .exit    | user | exit admin console |
| .date    | user | show current date example .help.date |
| .global  | user | show global configuration example .help.global |
| .poll    | user | execute commands in polling mode example .help.poll |
| .server  | user | show information on server example .help.server |
+-----+-----+-----+
| .file    | user | show latest files example .help.file |
| .history | user | show latest history example .help.history |
| .job     | user | show latest job example .help.job |
| .log     | user | show latest log example .help.log |
| .num     | user | show current local/remote job id example .help.num |
| .revision | user | show latest revisions example .help.revision |
| .summary | user | show summary |
+-----+-----+-----+
| .con     | user | show number of concurrent run example .help.con |
| .cpu     | user | show workers cpu info example .help.cpu |
| .disk    | user | show workers disk info example .help.disk |
| .grid    | user | show workers grid info example .help.grid |
| .os      | user | show workers os info example .help.os |
| .ram     | user | show workers disk info example .help.ram |
| .status  | user | show workers status info example .help.status |
| .toolchain | user | show workers toolchain info example .help.toolchain |
| .ver     | user | show workers version info example .help.ver |
| .worker  | user | show workers network info example .help.worker |
+-----+-----+-----+
```

Server related commands

The system administrator can use some of these commands to finer-tune the InTime Server to better suit the production environment.

38.1 Date and time commands

Commands to find out the date and time of the InTime Server.

- `.help.date` Show additional information and commands.
- `.date` Show the date of InTime Server.
- `.date.format` Show the date format. The default date format is yyyy-MM-dd.
- `.date.time` Show the time of InTime Server.
- `.date.time.format` Show the time format. The default time format is HH-mm-ss.

```
user> .date
+-----+
| DATE   |
+-----+
| 2014-10-03 |
+-----+

user> .date.time
+-----+
| TIME   |
+-----+
| 08:16:30 |
+-----+

user> .help.date
+-----+-----+
| USAGE                | DESCRIPTION |
+-----+-----+
| .date                | show current date |
| .date.format          | show current date format |
+-----+-----+
| .date.time            | show current time |
| .date.time.format      | show current time format |
+-----+-----+
```

38.2 Global configuration commands

Users can set up toolchains in InTime Server that are required by the workers. This allows each worker to pull the information when it starts up.

- `.help.global` Show additional information and commands.
- `.global.setting` Show global setting.
- `.global.toolchain` Show global toolchain.

```
user> .global.setting
+-----+-----+
| SETTING                | VALUE |
+-----+-----+
| File transfer port      | 39941 |
| Admin console port      | 39942 |
| File transfer method    | SFTP  |
| Server working directory | /home/intime/intimeserver/./plunify_server |
| Working Directory       | $USER_HOME/plunify/worker_jobs |
| Concurrent job limit    | 4     |
| Log verbosity           | normal |
| Timestamp               | 2014-10-03T06:06:15 |
+-----+-----+

user> .global.toolchain
+-----+-----+-----+-----+-----+
| NO. | OS   | VENDOR | TOOL   | PATH | LICENSE |
+-----+-----+-----+-----+-----+
```

```
| 1 | LINUX | Altera | QuartusII | /opt/Quartus/13.0.0/quartus | 2500@10.0.0.1 |
+---+-----+-----+-----+-----+-----+-----+-----+
1 row (0.01 sec), 2014-10-03 08:51:57
```

- `.global.set.toolchain` Setup new toolchain. (Available in admin mode only).
- `.global.del.toolchain` Remove existing toolchain. (Available in admin mode only)

Setup new global toolchain

The example below shows how to set up a new toolchain.

```
user> .admin
admin> .global.set.toolchain

Enter Operating System for tool, use .end to exit session.
Operating System: ('1' for Linux, '2' for Windows) [1]

admin.os> 1

Enter tool, use .end to exit session.
Tools: ('1' for QuartusII, '2' for ISE, '3' for Vivado)

admin.tool> 1

Enter installation path, use .end to exit session.
For example, /opt/Quartus/13.0.0/quartus

admin.path> /opt/Quartus/13.0.0/quartus

Enter license path, use .end to exit session.
For example, /opt/file.dat for node-locked license,
port@hostname for floating license(LM_LICENSE_FILE)

admin.license> 2500@10.0.0.1

Operating System : Linux
Tool : QuartusII
Installation path : /opt/Quartus/13.0.0/quartus
License : 2500@10.0.0.1

Save to session? ('y' for Yes or 'n' for No) [y]

admin.confirm> y

Add more toolchain? ('y' for Yes or 'n' for No) [y]

admin.confirm> n
admin> .global.toolchain

+---+-----+-----+-----+-----+-----+-----+-----+
| NO. | OS | VENDOR | TOOL | PATH | LICENSE |
+---+-----+-----+-----+-----+-----+-----+
| 1 | LINUX | Altera | QuartusII | /opt/Quartus/13.0.0/quartus | 2500@10.0.0.1 |
+---+-----+-----+-----+-----+-----+-----+

1 row (0.01 sec), 2014-10-03 08:51:57
```

Change concurrent run for workers

The example below shows how to change the number of concurrent run for workers. After approximately four minutes, check the new concurrent run value with the command `.cpu`

```
user> .admin
admin> .global.set.concore=4

Proceed to set concurrent core? ('y' for Yes or 'n' for No) [y]

admin.confirm> y
```

```
admin> .global.setting
```

SETTING	VALUE
File transfer port	39941
Admin console port	39942
File transfer method	SFTP
Server working directory	/home/intime/intimeserver/./plunify_server
Working Directory	\$USER_HOME/plunify/worker_jobs
Concurrent core for each worker	4
Log verbosity	normal
Timestamp	2014-10-03T06:06:15

```
admin> .cpu
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	TYPE	PHYCORE	CONCORE	MAXCORE
1	user10_00505621E3EE		user10	FREE	YES	INTEL 2.7	4	4	0

Change working directory for worker

The example below shows how to change the working directory for worker. In normal condition, the working directory for the worker is located in /USER_HOME/plunify folder. Due to low disk space, the next best solution is to change the working directory to another location. Let say the new working directory is located in /tmp/worker_jobs. Make sure user has permission to write to this new directory and it exists.

```
user> .admin
admin> .global.set.jobsdir=/tmp/worker_jobs
```

After 2 heartbeats sent by the worker, perform a .disk command to view the new working directory.

```
admin> .disk
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	DISK[GB]	DIRECTORY
1	user10_00505622093F		user10	FREE	YES	2.2	/tmp/worker_jobs

Change log verbosity for worker

Due to low disk space, changing the log verbosity from "normal" to "low" helps to reduce the size of worker's log file.

```
user> .admin
admin> .global.set.log_verbosity=low
```

Proceed to set log verbosity? ('y' for Yes or 'n' for No) [y]

```
admin.confirm> y
```

After 2 heartbeats sent by the worker, perform a .ver

```
admin> .ver
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	AGENT_VERSION	JAR_VERSION	VERBOSITY
1	user10_00505622093F		user10	FREE	YES	1.3-f3b6d7f	1.3.0-6396de8	LOW

Retry error string

Some general errors like license not enough may caused the toolchain to fail. InTime Server has the feature to match the error and perform another retry. The maximum number of retries is 3. There are a few standard errors that have been shipped in the installer.

```
user> .global.error
```

NO.	DATE	RETRY_ERRORS
1	2015-12-09 07:33	Error (316008): Selected feature of TimeQuest Timing Analyzer is not available with your current license
2	2015-12-09 07:33	Error (292027): Specified license does not contain information required to run the Quartus II software
3	2015-12-09 07:33	Error (10003): Can't open encrypted VHDL or Verilog HDL file
4	2015-12-09 07:33	Error (119013): Current license file does not support

Edit retry error string

User can add and remove error retry string. The example below shows how to add new error retry string. When InTime Server found an exact match on a particular strategy, it will reset that strategy.

```
user> .admin
```

```
admin> .global.set.error
```

```
Enter retry error string, use .end to exit session.
```

```
admin.error> License not found
```

```
Add more? ('y' for Yes or 'n' for No) [y]
```

```
admin.confirm> n
```

```
admin> .global.error
```

NO.	DATE	RETRY_ERRORS
1	2015-12-09 07:33	Error (316008): Selected feature of TimeQuest Timing Analyzer is not available with your current license
2	2015-12-09 07:33	Error (292027): Specified license does not contain information required to run the Quartus II software
3	2015-12-09 07:33	Error (10003): Can't open encrypted VHDL or Verilog HDL file
4	2015-12-09 07:33	Error (119013): Current license file does not support
5	2015-12-15 02:53	License not found

38.3 Server commands

Users can query the InTime Server on processor usage, memory usage and other information.

- `.help.server` Show additional information and commands.
- `.server.cpu` Show information on InTime Server CPU.
- `.server.disk` Show information on InTime Server disk space.
- `.server.ip` Show information on InTime Server IP address.
- `.server.jdbc` Show information on InTime Server JDBC settings, current supported are sqlite and mysql.
- `.server.mac` Show information on InTime Server MAC address.
- `.server.memory` Show information on InTime Server memory usage.
- `.server.network` Show information on InTime Server network information.
- `.server.os` Show information on InTime Server Operating System information.
- `.server.uptime` Show information on how long has InTime Server been running.
- `.server.git` Show information on InTime Server built information.
- `.server.lic` Show information on InTime Server license information.
- `.server.event` Show information on InTime Server events.
- `.server.version` Show information on InTime Server version.
- `.server.properties.set` Edit configuration of server. (Available in admin mode only)

```
user> .admin
admin> .server.properties.set.PRIORITY_FLAG=core
```

- `.server.properties` Show information on InTime Server settings and properties. Some of the properties are read-only (R) and cannot be changed. Properties with (RW) are those that can be edited using the `.server.set.properties` command.

```
user> .server.properties
```

NO.	READ/WRITE	KEY	VALUE
1	R	AUTO_FLAG	ON
2	R	ADMIN_CONSOLE_PORT	39942
3	R	COMMUNICATION_PORT	39940
4	R/W	CPUUTIL_FLAG	OFF
5	R/W	CPUUTIL_LIMIT	50%
6	R	FILETRANSFER_PORT	39941
7	R	HEARTBEATCHECK_TIME	60SECONDS
8	R/W	KEEP_FILE_FLAG	3DAYS
9	R/W	KEEP_REPORTS_FLAG	NO
10	R/W	KEEP_SOURCE_FLAG	YES
11	R	LICENSEEXPIRYCHECK_TIME	3600SECONDS
12	R/W	LICENSEFILE	/home/intime//intimeserver/./server.lic
13	R/W	LOGLEVEL	INFO
14	R/W	MATCHUSER_FLAG	NO
15	R/W	MAX_ADMIN_POLL	12
16	R/W	MAX_ADMIN_POLL_INTERVAL	5SECONDS
17	R	MAXTIMECHECK_TIME	60SECONDS
18	R	MAXTIMECHECK_TIME_JOB	15MINUTES
19	R/W	MEMUTIL_FLAG	OFF
20	R/W	MEMUTIL_LIMIT	1GB
21	R	MULTICAST	OFF
22	R	NETWORKWHITELIST_FLAG	OFF
23	R	QUEUECHECK_TIME	33SECONDS
24	R	REMOTE_ADMIN	ADMIN

25	R/W	REVISION_RETRY	YES	
26	R/W	PRIORITY_FLAG	CORE	
27	R	TIME_CHANGE_OFFLINE	10MINUTES	
28	R/W	TIME_REMOVE_RECORD	20MINUTES	
29	R	URL_TIMEOUT	30SECONDS	
30	R	URL_READ_TIMEOUT	60SECONDS	
+-----+-----+-----+-----+				

Server Properties Reference

- **AUTO_FLAG** Auto assign flag. The InTime Server automatically delegates jobs to workers when this is ON. This flag can be changed if a Private Enterprise license is in use. Another way to change this property is to supply the argument when starting the InTime Server. In Private Group license, it is always ON and read-only. AUTO_FLAG Value: on/off.

```
$ ./start_server.sh -auto off
```

- **ADMIN_CONSOLE_PORT** Admin console port number. Default port for admin console is 39942. If this port is being used, users can change this property via an argument when starting the InTime Server.

```
$ ./start_server.sh -adminport 15888
```

- **COMMUNICATION_PORT** Communication port number. Default port for communication is 39940. If this port is being used, users can change this property via an argument when starting the InTime Server.

```
$ ./start_server.sh -comport 15666
```

- **CPUUTIL_FLAG** CPU utilization flag. InTime Server will use the CPUUTIL_LIMIT property when assigning jobs to a worker. CPUUTIL_FLAG Value: on/off. Only those workers with utilization equal or less than CPUUTIL_LIMIT will be assigned.
- **CPUUTIL_LIMIT** Value: 0-100. Another way to change this property is via an argument when starting the InTime Server.

```
$ ./start_server.sh -cpuutil on -cpulimit 50
```

- **FILETRANSFER_PORT** File transfer port number. Default port for file transfer is 39941. If this port has been used, it can be changed via the appropriate argument when starting the InTime Server.

```
$ ./start_server.sh -fileport 15777
```

- **KEEP_FILE_FLAG** Keep the uploaded source and report files. The default value is 3 days. The file will be kept in the respective folder for the specified number of days.
- **KEEP_REPORTS_FLAG** Keep the uploaded report files. The default is NO. InTime Server will remove the report files after KEEP_FILE_FLAG days.
- **KEEP_SOURCE_FLAG** Keep the source files. Default is YES. Change the value to NO and InTime Server will remove the source files after KEEP_FILE_FLAG days.
- **LOGLEVEL** The log level of InTime Server. Default is info. The log will be rolled over after midnight every day. The logs can be found in INTIMESERVER_HOME/logs/intimeserver.log. The rolled-over logs will be named intimeserver.yyyy-MM-dd.log
- **MATCHUSER_FLAG** Match the USERID of worker. Default is YES. Job submitted by user will be assigned to workers that are started by the same user. If the USERID is blank, InTime Server will ignore MATCHUSER_FLAG and proceed to automatically assign the job.
- **MEMUTIL_FLAG** Memory utilization flag. InTime Server will use the MEMUTIL_FLAG when assigning jobs to a worker. MEMUTIL_FLAG Value: on/off. Only those workers with memory equal or more than MEMUTIL_LIMIT in GB will be assigned jobs.
- **MEMUTIL_LIMIT** Value in Giga-Bytes (GB). Another way to change is to supply the appropriate argument when starting the InTime Server.

```
$ ./start_server.sh -memutil on -memlimit 4
```

- **REMOTE_ADMIN** InTime Server by default does not allow admin mode to be invoked via the admin console, only via the loop-back interface or localhost. Another way to change this behavior is via an argument when starting the InTime Server.

```
$ ./start_server.sh -remoteadmin admin
```

- **PRIORITY_FLAG** InTime Server will use this value to assign to more workers or more CPU cores. The preferred method is to assign to more workers. PRIORITY_FLAG Value: worker/core. Another way to change this behavior is via an argument when starting the InTime Server.

```
$ ./start_server.sh -priority core
```

Job related commands

38.4 Job commands

- `.help.job` Show additional information and commands.
- `.job` Show latest job information.

To see the last four jobs, type `.job4` To see job number 88, type `.job=88`. Each job has a status, and the types of status are:

UPLOADING The project file is being uploaded to the InTime Server.

NEW The job has been created, but not assigned to any worker. You can also use `.job.assign=jobid` to assign the job.

ASSIGNED The job is assigned to a worker.

COMPLETED The job has completed.

CANCELLED The job was cancelled by the user.

ERROR The job has an error. Check the InTime log for details.

QUEUED The job is currently in the job queue waiting for a worker to pick it up.

- `.help.file` Show additional information and commands.
- `.file` Show the latest file details. It displays the source files present and the reports for the last job. The file size is in bytes.
- `.help.history` Show additional information and commands.
- `.history` Show the latest job status report sent by InTime.
- `.help.revision` Show additional information and commands.
- `.revision` Show the latest job status report sent by the tools. For user running InTime in Tcl mode, this feature allows the user to view the current process carried out by the tool.
- `.help.log` Show additional information and commands.
- `.log` Show latest job log details.

```
user> .job
```

```
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID          | JOBID | P.JOBID | USERID | START | FINISH | TIME   | STATUS |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1   | user1_22000B40A9E3 | 998   | 997     | user1   | 03:35 | 03:51 | 15m:40s | COMPLETED |
+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
user> .file
```

```
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | TYPE  | JOBID | FILENAME                                     | SIZE[B] |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1   | SOURCE | 998   | 998_flow_config.ini                       | 1479    |
| 2   | SOURCE | 998   | 998_upload_fileset.txt                    | 698     |
| 3   | SOURCE | 998   | eight_bit_uc.qar                         | 120502  |
| 4   | SOURCE | 998   | eight_bit_uc_fallback.zip                 | 97439   |
+-----+-----+-----+-----+-----+-----+-----+-----+
|     |     |     | TOTAL                                     | 215 KB  |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1   | REPORTS | 998   | user1_22000A41049F_998_cal_speed_low_fileset.txt | 541     |
| 2   | REPORTS | 998   | user1_22000A41049F_998_cal_speed_low_reports.zip | 17274   |
| 3   | REPORTS | 998   | user1_22000A41049F_998_cal_speed_low_status.txt | 1209    |
| 4   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_13_fileset.txt | 563     |
| 5   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_13_reports.zip | 17102   |
| 6   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_13_status.txt | 1221    |
| 7   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_18_fileset.txt | 563     |
| 8   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_18_reports.zip | 17233   |
| 9   | REPORTS | 998   | user1_22000A41049F_998_g_optimize_18_status.txt | 1221    |
| 10  | REPORTS | 998   | user1_22000A41049F_998_g_optimize_8_fileset.txt | 561     |
+-----+-----+-----+-----+-----+-----+-----+-----+
|     |     |     | TOTAL                                     | 371.5 KB |
+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
user> .history
```

```
+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID | JOBID | USERID | STATUS   | START | FINISH | TIME   | ROW | REVISIONS |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1   | user1    | 998   | user1   | COMPLETED | 03:35 | 03:39 | 03m:43s | 1   | cal_speed |
+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
| 2 | user1 | 998 | user1 | COMPLETED | 03:39 | 03:43 | 03m:34s | 1 | g_opt_8 |
| 3 | user1 | 998 | user1 | COMPLETED | 03:43 | 03:46 | 03m:10s | 1 | g_opt_13 |
| 4 | user1 | 998 | user1 | COMPLETED | 03:47 | 03:51 | 03m:39s | 1 | g_opt_18 |
| 5 | user1 | 998 | user1 | COMPLETED | 03:35 | 03:38 | 03m:07s | 1 | g_opt_1 |
| 6 | user1 | 998 | user1 | COMPLETED | 03:39 | 03:42 | 03m:30s | 1 | g_opt_6 |
| 7 | user1 | 998 | user1 | COMPLETED | 03:43 | 03:46 | 03m:31s | 1 | g_opt_12 |
| 8 | user1 | 998 | user1 | COMPLETED | 03:47 | 03:50 | 03m:26s | 1 | g_opt_17 |
| 9 | user1 | 998 | user1 | COMPLETED | 03:35 | 03:38 | 03m:14s | 1 | g_opt_2 |
| 10 | user1 | 998 | user1 | COMPLETED | 03:39 | 03:42 | 03m:14s | 1 | g_opt_7 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
user> .revision
```

```
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID | JOBID | USERID | STATUS | TOOLCHAIN_STEP | REVISION | START | UPDATED | TIME | RETRY |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
| 1 | user1_22000A4109F | 998 | user1 | COMPLETED | RUNDONE | cal_speed_low | 03:34 | 03:39 | 03m:26s | 1/3 |
| 2 | user1_22000B409D4 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_1 | 03:34 | 03:38 | 03m:26s | 1/3 |
| 3 | user1_22000B40A72 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_2 | 03:34 | 03:38 | 03m:26s | 2/3 |
| 4 | user1_22000B45123 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_3 | 03:34 | 03:38 | 03m:26s | 1/3 |
| 5 | user1_22000B45876 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_4 | 03:34 | 03:39 | 03m:26s | 2/3 |
| 6 | user1_22000B45123 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_5 | 03:34 | 03:42 | 03m:26s | 3/3 |
| 7 | user1_22000B409D4 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_6 | 03:34 | 03:42 | 03m:26s | 2/3 |
| 8 | user1_22000B40A72 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_7 | 03:34 | 03:42 | 03m:26s | 1/3 |
| 9 | user1_22000A4109F | 998 | user1 | COMPLETED | RUNDONE | g_optimize_8 | 03:34 | 03:43 | 03m:26s | 1/3 |
| 10 | user1_22000B45876 | 998 | user1 | COMPLETED | RUNDONE | g_optimize_9 | 03:34 | 03:43 | 03m:26s | 2/3 |
+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+-----+
```

```
user> .log
```

```
HH:mm:ss | UUID | CLIENTID | STEP | MESSAGE
03:34:44 | A-F5F349 | user1_22000B40A9E3 | PASS | Submitting a new job, 998
03:34:59 | A-F60530 | user1_22000B40A9E3 | PASS | Uploading project file.
03:35:29 | A-E538BE | user1_22000B451923 | PASS | Downloading revision g_optimize_3
03:46:37 | A-495FF2 | user1_22000B451923 | PASS | Downloading revision g_optimize_15
03:46:49 | A-15B1BD | user1_22000B409ED4 | PASS | Finishing revision g_optimize_12
03:46:56 | A-8BA3B3 | user1_22000B40A572 | PASS | Downloading revision g_optimize_16
03:46:57 | A-83423A | user1_22000A41049F | PASS | Finishing revision g_optimize_13
03:47:17 | A-01411C | user1_22000B409ED4 | PASS | Downloading revision g_optimize_17
03:47:19 | A-44D36E | user1_22000B458D76 | PASS | Finishing revision g_optimize_14
03:47:24 | A-86410D | user1_22000A41049F | PASS | Downloading revision g_optimize_18
03:47:46 | A-1814D9 | user1_22000B458D76 | PASS | Downloading revision g_optimize_19
03:50:06 | A-ED9722 | user1_22000B451923 | PASS | Finishing revision g_optimize_15
03:50:07 | A-D73889 | user1_22000B40A572 | PASS | Finishing revision g_optimize_16
03:50:43 | A-D24C33 | user1_22000B409ED4 | PASS | Finishing revision g_optimize_17
03:51:01 | A-843C18 | user1_22000B458D76 | PASS | Finishing revision g_optimize_19
03:51:03 | A-A0F46B | user1_22000A41049F | PASS | Completing job 998
```

Worker related commands

38.5 CPU commands

- `.help.cpu` Show additional information and commands.
- `.cpu` Show CPU information of workers.
- `.con` Show CPU summary of all workers.

Display the workers' physical cores, concurrent core and maximum core values. The + symbol denotes the total physical cores on that machine. Under the command `.cpu.jobid` and `.con.userid`, the * symbol denotes the total physical cores based on the user account.

Display the workers' CPU type, number of cores and total CPU utilization. To see more examples of `.cpu`, type `.help.cpu` PHYCORE refers to physical hardware cores. CONCORE is the number of concurrent cores that the worker has been configured using `.global.set.concore`. MAXCORE is the InTime Server assigned limit on of number of cores to use.

```
user> .cpu
```

NO	CLIENTID	JOBID	USERID	STATUS	ALIVE	TYPE	PHYCORE	CONCORE	MAXCORE	UTIL
1	user1		user1	FREE	YES	AMD	1	1	0	0
2	user1		user1	FREE	YES	AMD	1	1	0	0
3	user1		user1	FREE	YES	AMD	1	1	0	0
4	user1		user1	FREE	YES	AMD	1	1	0	0
5	user1		user1	FREE	YES	AMD	1	1	0	0

```
user> .con
```

NO.	HOSTNAME	MAC_ADDRESS	IP_ADDRESS	AGENT	PHYCORE	CONCORE	MAXCORE
1	10-231-2-185	22000AE702B9	10.231.2.185	1	1 +	1	0
2	10-147-29-112	22000B41047D	10.147.29.118	1	1 +	1	0
3	10-183-45-71	22000B421BDE	10.183.45.71	1	1 +	1	0
4	10-167-14-181	22000B4516F7	10.167.149.181	1	1 +	1	0
5	10-181-21-195	22000B458FAD	10.181.21.195	1	1 +	1	0
TOTAL				5	5	5	0
CONCURRENT_USED							0
CONCURRENT_LEFT							100
CONCURRENT_TOTAL							100

38.6 Operating System commands

- `.os` Show Operating System information of the workers.

```
user> .os
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	SYSTEM	ARCH	KERNEL	DISTRO
1	user1		user1	FREE	YES	LINUX	x86_64	2.6.18	CENTOS 5.6
2	user1		user1	FREE	YES	LINUX	x86_64	2.6.18	CENTOS 5.6
3	user1		user1	FREE	YES	LINUX	x86_64	2.6.18	CENTOS 5.6
4	user1		user1	FREE	YES	LINUX	x86_64	2.6.18	CENTOS 5.6
5	user1		user1	FREE	YES	LINUX	x86_64	2.6.18	CENTOS 5.6

38.7 Disk and Memory commands

- `.disk` Show the Disk space usage of the workers.
- `.ram` Show the Memory availability of the workers.

```
user> .disk
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	DISK[GB]	DIRECTORY
1	user1		user1	FREE	YES	71.4	/home/user1/plunify/wrkr_jobs
2	user1		user1	FREE	YES	71.4	/home/user1/plunify/wrkr_jobs
3	user1		user1	FREE	YES	71.4	/home/user1/plunify/wrkr_jobs
4	user1		user1	FREE	YES	71.4	/home/user1/plunify/wrkr_jobs
5	user1		user1	FREE	YES	71.4	/home/user1/plunify/wrkr_jobs

```
user> .ram
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	FREE[GB]	TOTAL[GB]
-----	----------	-------	--------	--------	-------	----------	-----------

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	HOSTNAME	MAC_ADDRESS	IP_ADDRESS
1	user1_22000AE702B9		user1	FREE	YES	3.6	3.8	
2	user1_22000B41047D		user1	FREE	YES	3.6	3.8	
3	user1_22000B421BDE		user1	FREE	YES	3.6	3.8	
4	user1_22000B4516F7		user1	FREE	YES	3.6	3.8	
5	user1_22000B458FAD		user1	FREE	YES	3.6	3.8	

38.8 Networking commands

- `.worker` Show the hostname, IP address and MAC address of the workers.

```
user> .worker
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	HOSTNAME	MAC_ADDRESS	IP_ADDRESS
1	user1_22		user1	FREE	YES	10-147-2	22000B41047D	10.147.29.118
2	user1_27		user1	FREE	YES	10-167-1	22000B4516F7	10.167.149.181
3	user1_2D		user1	FREE	YES	10-181-2	22000B458FAD	10.181.21.195
4	user1_2E		user1	FREE	YES	10-183-4	22000B421BDE	10.183.45.71
5	user1_29		user1	FREE	YES	10-231-2	22000AE702B9	10.231.2.185

38.9 Toolchain commands

- `.toolchain` Show the vendor, tool and version of the workers.

```
user> .toolchain
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	COUNT	VENDOR	TOOL	VERSION
1	user1_220		user1	FREE	YES	2	ALTERA	QUARTUSII	13.0.0
2	user1_220		user1	FREE	YES	2	ALTERA	QUARTUSII	13.1.2
3	user1_220		user1	FREE	YES	2	ALTERA	QUARTUSII	13.0.0
4	user1_220		user1	FREE	YES	2	ALTERA	QUARTUSII	13.1.2
5	user1_220		user1	FREE	YES	2	ALTERA	QUARTUSII	13.0.0

38.10 Health commands

- `.status` Show the health of the workers and if they are alive. It shows if the workers are free or busy.

```
user> .status
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	B.LIST	MARKED	REVISION	LAST_HEARTBEAT
1	user1_22000AE70		user1	FREE	YES	NO	NIL		02m:17s (00m:19s)
2	user1_22000B410		user1	FREE	YES	NO	NIL		02m:17s (00m:18s)
3	user1_22000B421		user1	FREE	YES	NO	NIL		02m:17s (00m:18s)
4	user1_22000B451		user1	FREE	YES	NO	NIL		02m:17s (00m:18s)
5	user1_22000B458		user1	FREE	YES	NO	NIL		02m:17s (00m:19s)

38.11 Grid commands

- `.grid` Show the resource ID when workers are running in a grid cluster.

```
user> .grid
```

NO.	CLIENTID	USERID	ASSIGNED_JOBID	PID	GRIDID
1	user_123456789012_26090	user	77	26090	12345
2	user_123456789013_26134	user	77	26134	12346

38.12 Version commands

- `.ver` Show version information of the workers. It has the log verbosity of the workers.

```
user> .ver
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	AGENT_VERSION	JAR_VERSION	VERBOSITY
1	user1_220		user1	FREE	YES	1.2-fa13b7e	1.2-a4b0498	LOW
2	user1_220		user1	FREE	YES	1.2-fa13b7e	1.2-a4b0498	LOW
3	user1_220		user1	FREE	YES	1.2-fa13b7e	1.2-a4b0498	LOW
4	user1_220		user1	FREE	YES	1.2-fa13b7e	1.2-a4b0498	LOW
5	user1_220		user1	FREE	YES	1.2-fa13b7e	1.2-a4b0498	LOW

38.13 Shutdown workers commands

- `.intime.set.terminate` Mark workers for termination. After two heartbeats, a marked worker will terminate.
- `.intime.del.terminate` Unmark workers so that they will not be terminated.

```
user> .admin
admin> .intime.set.terminate
```

INDEX.	CLIENTID	USERID	STATUS	ALIVE	B.LIST	MARKED	LAST_HEARTBEAT
1	user1_22000AE702B9	user1	FREE	YES	NO	NIL	03:11 (01m:17s)
2	user1_22000B41047D	user1	FREE	YES	NO	NIL	03:11 (01m:17s)
3	user1_22000B421BDE	user1	FREE	YES	NO	NIL	03:11 (01m:17s)
4	user1_22000B4516F7	user1	FREE	YES	NO	NIL	03:11 (01m:17s)
5	user1_22000B458FAD	user1	FREE	YES	NO	NIL	03:11 (01m:18s)

Enter worker INDEX numbers and/or ranges separated by commas.
For example, 1,2,3-5
admin.intime.set.terminate> 1

Proceed to mark agent to terminate? ('n' for No or 'y' for Yes) [n]

```
admin.confirm> y
admin> .status
```

NO.	CLIENTID	JOBID	USERID	STATUS	ALIVE	B.LIST	MARKED	LAST_HEARTBEAT
1	user1_22000AE702B9		user1	FREE	YES	NO	TERMINATE	03:12 (00m:02s)
2	user1_22000B41047D		user1	FREE	YES	NO	NIL	03:12 (00m:19s)
3	user1_22000B421BDE		user1	FREE	YES	NO	NIL	03:12 (00m:19s)
4	user1_22000B4516F7		user1	FREE	YES	NO	NIL	03:12 (00m:19s)
5	user1_22000B458FAD		user1	FREE	YES	NO	NIL	03:12 (00m:20s)

```
+-----+-----+-----+-----+-----+-----+-----+-----+
admin>
```

38.14 Blacklist workers commands

User can blacklist workers so that new jobs will not be assigned to those workers.

- `.intime.set.blacklist` Blacklist workers. Job will not be assigned to the workers.
- `.intime.del.blacklist` Remove blacklisted workers.

```
user> .admin
admin> .intime.set.blacklist

+-----+-----+-----+-----+-----+-----+-----+-----+
| INDEX. | CLIENTID                | USERID | STATUS | ALIVE | B.LIST | MARKED | LAST_HEARTBEAT |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1      | user1_22000B412014      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:18s) |
| 2      | user1_22000B428179      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:18s) |
| 3      | user1_22000B450FAF      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:22s) |
| 4      | user1_22000B45186F      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:19s) |
| 5      | user1_22000B460FAD      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:19s) |
| 6      | user1_22000B4693FA      | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:28s) |
+-----+-----+-----+-----+-----+-----+-----+-----+

Enter worker INDEX numbers and/or ranges separated by commas.
For example, 1,2,4-6
admin.intime.set.blacklist> 1-3

Proceed to set blacklist? ('y' for Yes or 'n' for No) [y]

admin.confirm> y
admin> .status

+-----+-----+-----+-----+-----+-----+-----+-----+
| NO. | CLIENTID                | JOBID | USERID | STATUS | ALIVE | B.LIST | MARKED | LAST_HEARTBEAT |
+-----+-----+-----+-----+-----+-----+-----+-----+
| 1    | user1_22000B412014      |       | user1   | FREE   | YES   | YES    | NIL    | 09:50 (00m:02s) |
| 2    | user1_22000B428179      |       | user1   | FREE   | YES   | YES    | NIL    | 09:50 (00m:04s) |
| 3    | user1_22000B450FAF      |       | user1   | FREE   | YES   | YES    | NIL    | 09:50 (00m:04s) |
| 4    | user1_22000B45186F      |       | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:05s) |
| 5    | user1_22000B460FAD      |       | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:04s) |
| 6    | user1_22000B4693FA      |       | user1   | FREE   | YES   | NO     | NIL    | 09:50 (00m:14s) |
+-----+-----+-----+-----+-----+-----+-----+-----+
```

38.15 Security Commands

Remote Administration

In admin console, there are some basic security features built in. When connecting to the InTime Server admin console from another host, the user can only be in user mode. To allow a user to perform admin mode functions, start InTime server with the following option:

```
$ ./start_server.sh -remoteadmin <argument>
```

disable to disable remote admin console, user mode is also disabled. The only way is go to admin console is from the localhost of the InTime Server. Note that the web admin portal is not disabled.

user to allow only user mode when connect remotely. This is the default if -remoteadmin is not used.

admin to allow both admin and user mode when connect remotely.

To ensure that the web admin console can only be accessed locally, i.e. through 127.0.0.1, use the following option:

```
$ ./start_server.sh -acllocal
```

To save and use the same arguments everytime the server is restarted, edit the `plunify.args` file located in the InTime Server installation directory.

```
-remoteadmin admin
```

By default, the `-remoteadmin` is specified. The `-acllocal` argument can also be added to this file.

Creating a blacklist (hosts.deny)

In the InTimeServer installation directory, an administrator can create a `hosts.deny` file. With this file, an administrator can specify which host to deny access to. The format of the file is as follows:

```
$ cd INTIMESERVER_HOME
$ vi hosts.deny

192.168.2.10
192.168.5.200/32
192.168.1.0/24
```

Format of `hosts.deny`. The first line blocks host 192.168.2.10. The second line blocks 192.168.5.200/32. This is a CIDR notation with a mask of 255.255.255.255. The last line blocks a subnet of 192.168.1.0/24. All hosts in the range 192.168.1.1 - 192.168.1.254 will not be allowed to login to admin console.

Creating a whitelist (hosts.allow)

If the network is too big to deny unwanted hosts, another method is to create the whitelist. An administrator can create a `hosts.allow` file. To enable this feature, the server has to be started with extra argument. Now all hosts will be blocked by default. Only hosts listed in the `hosts.allow` file will be allowed to do remote admin console.

```
$ ./start_server.sh -hostsallow on

$ cd INTIMESERVER_HOME
$ vi hosts.allow

192.168.6.1
192.168.23.9/32
192.168.8.0/24
```

Format of `hosts.allow`. The first line is to allow host 192.168.6.1. The second line is to allow 192.168.23.9/32. This is a CIDR notation with a mask of 255.255.255.255. The last line allows a subnet of 192.168.8.0/24. All hosts in the range 192.168.8.1 - 192.168.8.254 will be allowed to login to the admin console.

If the record appears in both `hosts.allow` and `hosts.deny`, the host will be blocked. `hosts.deny` has priority. If `hosts.allow` is turned on, it is advisable to remove `hosts.deny` to avoid confusion. '

39. InTime Arguments Reference

These arguments are used with InTime executable. For example, this command will show the help message

```
./intime.sh -h
```

Argument Name	Description
-h	Prints this help message.
-cluster	This is a mandatory argument when using Cluster mode. Options include lsf, pbs, sge, slurm and ssh.
-clusterargs	This is an optional argument when using Cluster mode. Options include .
-comport	Specifies the network port to use for server communication during this session (Defaults to configured comport).
-custom_flow_config	Specifies a user flow configuration file to use for this session, instead of using project-specific flow configurations.
-custom_logs_path	Specifies a user location for log files.
-custom_session_path	Specifies a user path to use for this session, instead of "<user_home>/plunify".
-env	Uses a custom environment variable for the -tc toolchain path.
-ip	Specifies the IP address of the InTime Server (Defaults to the configured IP address).
-locale	Specifies the locale for this session (Defaults to the system locale).
-log <file_path>	Specifies a custom target file to which session logging must be done.
-mode <tcl, gui, batch>	Specifies the user interface mode (Defaults to <gui>).
-no_global_config	Specifies that this client should not fetch global parameters during startup in a private cloud environment.
-no_global_toolchains	Specifies that this client should not fetch global toolchains during startup in a private cloud environment.
-platform <xcb, minimal>	Defaults to <xcb>, which is for GUI mode. Use minimal for Tcl mode.
-project <file_path>	Specifies the path to a vendor's project or InTime project file.
-revision <value>	Specifies the default revision/run of the project to work on.
-s <file_path>	Specifies a startup script to run.
-singledb	Uses the db file specified under the "singledb" settings in plunify.ini as the db file.
-ssh	Uses the SSH protocol to connect to InTime Server. InTime server must be started with the -ssh argument as well.
-stdout <all, tcl>	Specifies which messages forwarded to stdout when running in tcl/batch modes (Defaults to <all>).
-tc <toolchain>	Specifies the vendor toolchain to be used for this session. Valid toolchain values: <i>vivado, ise, quartusii, quartuspp</i>
-tclargs	Arguments to pass to script specified using -s.
-user_args	Specifies the USER_ARGS macro for LSF/PBS/SGE grids.
-version	Prints the version of InTime.
-vendor_toolchain <value>	The preferred toolchain to use for this session.
-vendor_toolchain_version <value>	The preferred toolchain version to use for this session.
-vendor_toolchain_binpath <value>	The preferred bin/exe path of the vendor toolchain to use for this session.
-username	Specifies username for the session.

40. InTime Agent Arguments Reference

These arguments are used with InTime Agent executable. For example, this command will show the help message

```
./intime_agent.sh -h
```

Argument Name	Description
-h	Prints this help message.
-v	Prints the version of the agent.
-nolog	Indicates that the agent should create a session log file for this session.
-username	Specifies username for the session. When not specified, the agent will automatically use the username of the current user.
-mode	Specifies the execution mode of the agent. The following options are supported (defaults to <code>gui</code>): <code>background</code> : Execute in background mode without showing the agent's user interface. When using this mode, also add the following argument to avoid the loading of system display libraries into memory upon agent startup: <code>-platform minimal</code> . <code>gui</code> : Execute in GUI mode, showing the agent's user interface.
-locale	Specifies the locale for which translations should be loaded.
-ip	Specifies the IP address of the server for this session. When not specified it defaults to the user configured IP address.
-comport	Specifies the communications port to use for communication with the server for this session. When not specified, it defaults to the user configured port.
-no_agent_limit	Specifies that multiple agents can run on the same machine. By default only one agent is allowed to run on a single machine. However in some environments it makes sense to allow multiple agents to run on the same machine. When specified, the agent's behaviour differs from the default behaviour in the following ways: <ol style="list-style-type: none"> 1. No agent lockfile mechanism is used. 2. The location of the agent log and configuration files are stored in a unique location per agent session: <code>~/.plunify/<usr>_<mac>_<pid>/</code> instead of the normally used <code>~/.plunify/<usr>_<mac>/</code> location. 3. A concurrent run limit of 1 is <i>always</i> used.
-max_runs	Limits this agent to the specified number of runs. When the number of runs have been completed the agent will terminate itself. Note that the concurrent run limit of the agent is automatically adjusted to respect this limit. Note: When the current job is cancelled, the agent will also terminate itself when the limit has been reached during the job which is being cancelled.
-remote_job	Limits this agent to a specified remote job id. The InTime server will only assign jobs which are part of the specified ID to this agent. Note: When the current job is cancelled, the agent will terminate itself as it will not be able to accept any other jobs and therefore has no reason to stay alive.

41. InTime Tcl Reference

InTime integrates the Tool Command Language(Tcl) to support scripting and fine-grained control of its features. This reference guide describes available InTime Tcl commands. Similar to Tcl/Tk language rules, InTime Tcl commands use similar syntax, notations and design rules. Typing 'help' in the InTime Tcl Console brings up a similar description of the commands supported. The commands are generally organized hierarchically and can consist of several consecutive command invocations.

41.1 Examples

Multiple commands To retrieve the project filename, three commands are required, **project** and **info**, followed by *<file_name>*

```
plunify> project info file_name
```

Multiple commands with an argument To retrieve a summary of the job, two commands are required, job and summary, followed by jobID=2

```
plunify> job summary 2
```

For more example scripts, please refer to Using Tcl Scripts.

41.2 Top-level Commands

Typing the top-level command in the Tcl console displays the list of secondary commands. For example, typing 'flow' gives a list of commands in the 'flow' category.

Commands	Description
exit	Exit InTime.
flow	Control and execute the InTime flow.
flow_steps	Execute individual steps in the InTime flow.
help	Display this help message.
history	Show a record of commands executed previously.
job	Run operations on existing jobs.
license	Manage licenses and display the current InTime license file.
log <message> <type>	Send specific log messages to the InTime session log. Example: <code>log something failed error</code> Supported types: <info>, <warning>, <error>
misc	Run miscellaneous helper functions.
project	Get details and set properties of the opened project.
project info	Get information about the project command (used together with the <i>Project</i> command).
results	Retrieve details of the current results set.
run_target	Configure, test and perform actions specific to different run targets.
strategy	Provide details of the currently active strategy/result.
vendors	Configure vendor tool settings.
msgbox	(Deprecated) Show or get feedback from user using a message box.

41.3 FLOW

Control and execute the InTime flow.

Argument	Description
add <property_name> <value>	Add the specified value into the desired flow property (supports only certain flow properties).
clear <options>	Clear the value of a flow property value.
	Supported options: Refer to the flow set property values below.
get <property_name>	Get the specified flow property's value.
load_recipe <recipe_tcl_alias>	Required before executing flow run_recipe <recipe_tcl_alias> command to initialize recipe parameters.
properties	List and describe all customizable configuration properties of the flow.
recipe errors	Print errors logged during the execution of the last recipe.
recipe name	Print the name of the recipe that was just executed. (Empty string if nothing was ran.
recipe is_experimental <recipe_tcl_alias>	Check if <recipe_tcl_alias> is an experimental recipe.
recipe is_supported <recipe_tcl_alias>	Check if <recipe_tcl_alias> is supported by the current project.
recipe is_user_defined <recipe_tcl_alias>	Check if <recipe_tcl_alias> is a user-defined recipe.
recipe skipped	Check if the last recipe was skipped by InTime (Return true if it was skipped).
recipe stopped	Check if the last recipe was stopped by the user (Return true if it was stopped).
recipe job_ids	Return a list of job IDs generated in the last recipe. E.g. 10,11,12
recipes <supported,all>	Returns a list of recipe tcl aliases. By defaults, it lists only supported recipes for the vendor. Use flow run_recipe <recipe_tcl_alias> to run a recipe.
remove <property_name> <value>	Remove the specified flow property's value.
rerun	Rerun marked strategies.
reset	Reset the internal flow history. Subsequent flows will start again with a root parent revision.
resume job <local_job_id>	Resume the selected job.
restore_defaults	Restore flow properties to their defaults.
restore_point load <name>	Restore the flow configuration from the given restore point.
restore_point save <name>	Create a restore point with the given name.
run	Run the InTime flow: Analyze design, strategize and run generated strategies.
run_recipe <recipe_tcl_alias>	Run the specified recipe.
set <property_name> <value>	Set the specified flow property to a particular value. Refer to the flow set property values below.
toolchain_steps clear_custom	Clear any specified custom step.
toolchain_steps clear_custom_args	Clear any specified custom step arguments.
toolchain_steps get_custom	Get the custom toolchain step to use.
toolchain_steps get_custom_args	Get the arguments to use for the custom toolchain step.
toolchain_steps is_custom_supported	Indicate if the current vendor backend supports custom enabling/disabling of toolchain steps.

Argument	Description
toolchain_steps list <i><match_expr></i>	Return a list of toolchain steps. Possible match expressions: <i><all,enabled,disabled></i> . Default: <i><all></i> .
toolchain_steps set_custom <i><custom_step_name></i>	Set the custom toolchain step to use.
toolchain_steps set_custom_args <i><args></i>	Set the arguments to use for the custom toolchain step.
toolchain_steps toggle <i><step_name,all></i> <i><enable,disable></i>	Enable/disable the specified toolchain step, or all steps.
unset parent_revision	Reset the parent revision to the original one (the "root parent").

FLOW SET

Below is a list of property names available for the FLOW SET command. To run this, `FLOW set <*property name*> <value>`

If you are unsure of the current property values, use the `flow properties` command to display all the current values.

Property Name & Usage	Description
auto_clock_margin_adjustment	For auto adjust clock margin value (recipe)
auto_max_runtime	for auto-optimizing strategy_max_runtime
auto_sync_results	Enable synchronization to master database
clean_keep_whitelist	Preserve certain files during compilation. Specify different file types in the curly brackets separated by spaces, e.g. {.bit .gz}. A ZIP file containing the whitelisted files will be generated in <i><project dir>/plunify.jobs/<job ID>/<user><MAC address><remote job ID>_<revision name>_whitelist.zip</i> . Requirements: Full InTime license
clock_increment_value	Specify the incrementing step value for clock uncertainty (recipe)
clock_initial_value	Specify the first clock value of clock uncertainty (recipe)
concurrent_runs	Indicate the concurrent run count for this job.
control_allow_eval_ip	Set to true if InTime should allow evaluation IP in the design.
control_create_bitstreams	Set to true to generate programming files for runs. False by default.
control_create_epaf	Set to true to create an encrypted results archive (.epaf) during Private Cloud operations.
control_force_continue	Set to true to stop the current iteration when there is no valid result in the current round.
control_ignore_drc_errors	Set to true to continue even when DRC errors occur.
control_ignore_errors	Set to true to proceed even when errors occur.
control_inherit_synthesis_only	Set to true to discard non-synthesis settings from the parent revision.
control_learn_from_estimates	Set to true to learn from estimated results.
control_num_timingpaths	Specify the number of timing paths to analyze
control_regen_ip_targets	Set to true to re-generate IP targets.
control_reuse_synthesis_results	Set to true to reuse synthesis results from the parent revision.
control_stop_when_goal_met	Set to true to stop the current iteration when the Goal Target is met.
control_stop_when_post_place_timing_bad	Set to true to stop when post-placement timing is bad (worse than or equal to a specified value).
custom_properties	Specify a custom property map.
goal	Specify the optimization goal.
goal_based_target	Specify the target metric used to evaluate the design goal.
goal_quartusii_enable_recovery_time_in_tns	QuartusII-specific: Ignore Recovery Time during TNS extraction.
goal_quartusii_enable_removal_time_in_tns	QuartusII-specific: Ignore Removal Time during TNS extraction.
goal_quartusPP_enable_recovery_time_in_tns	QuartusPP-specific: Ignore Recovery Time during TNS extraction.
goal_quartusPP_enable_removal_time_in_tns	QuartusPP-specific: Ignore Removal Time during TNS extraction.
goal_quartusPP_enable_mpw_time_in_tns	Quartuspp-specific: Ignore Minimum Pulse Width Time during TNS extraction.
goal_quartusii_enable_mpw_time_in_tns	QuartusII-specific: Ignore Minimum Pulse Width Time during TNS extraction.
goal_vivado_enable_pws_time_in_tns	Vivado-specific: Ignore Pulse Width Slack Time during TNS extraction.

Property Name & Usage	Description
initial_compilation	Specify the target run environment for the parent revision (if results do not exist).
max_dcp_keep	Vivado-specific: Specify the number of DCP netlists to retain on disk per job.
parent_revision_existing_results	Indicate how to handle existing parent revision results. Supported values: <i><reuse></i> <i><rerun></i> <i><prompt></i>
parent_revision_job_id	Specify the parent revision's local job id.
parent_revision_missing_results	Indicate how to handle missing parent revision results. Supported values: <i><stop></i> <i><rerun></i> <i><prompt></i>
parent_revision_name	Specify the parent revision's name.
post_place_tns_limit	Specify the post-placement TNS limit value
post_place_whs_limit	Specify the post-placement worst hold slack limit value
post_place_wns_limit	Specify the post-placement worst setup slack limit value
project_file	Contains the project file name.
remote_auto_assign	Indicate if auto assignment should happen for Private Cloud jobs.
remote_job_polling_policy	Remote job polling policy. Use with care -- InTime terminates multi-round recipes when this is set to 'stop'.
remote_off_peak	Indicate if Off-Peak mode should be used for the public cloud remote jobs (only when doing remote compiles).
remote_server_type	Set the server type to use for Plunify Cloud submissions.
rounds	Specify the number of optimization rounds.
root_initial_compilation	Specify the target run environment for analysis of the main parent revision initial compilation (if results do not exist).
runs_per_round	Specify the number of strategies to generate per round.
run_target	Specify the target run environment for this process.
setting_filters_template	Specify the Setting Filters template file to use.
strategy_algorithm	Specify the strategy generation flow.
strategy_cls_multiplier	Only for Hot Start. Default is 0.5 (50%). Control the number of strategies that uses a new Hot Start algorithm, as a percentage of the total number of strategies generated.
strategy_custom	Specify the custom strategy when the Strategy Algorithm is set to custom.
strategy_delay_interval	Specify an interval in seconds between the start of every strategy in a job/round. (Default: 5 seconds)
strategy_export_synth_name	Specify the name of the synthesis revision to use when exporting a strategy.
strategy_export_impl_name	Specify the name of the implementation revision to use when exporting a strategy.
strategy_max_runtime	Set the maximum compilation time for Plunify Cloud jobs.

Property Name & Usage	Description
strategy_prefix	Specify the strategy prefix to use when deciding new strategy names.
strategy_rerun_learning_only	Rerun: Consider only Learning Strategy results
strategy_retry_count	Specify the number of retries if a strategy fails.
strategy_reuse_multiplier	Hot Start: Default is 0.5 (50%). Control the re-use of past strategies. Setting it to 0 means no re-use.
strategy_settings_scope	The settings application scope of strategies.
strategy_time_unit	Set the time unit for the maximum runtime.
strategy_use_all_training_data	Auto Pilot: Use the entire training data history when deciding the next recipe
strategy_vary_synth_if_ooc	Vivado Tcl project-specific: Vary synthesis even if the module is out-of-context
strategy_verification_strictness	(fail_on_count_mismatch
strategy_xp_multiplier	Only for the Default recipe. Default is 0.5 (50%). Control the number of enhanced strategies that uses a new Default algorithm, as a percentage of the total number of strategies generated.
toolchain_steps_custom	Specify the custom toolchain step to use.
toolchain_steps_custom_args	Set the custom toolchain step's arguments.
toolchain_steps_disabled	Specify the disabled toolchain steps.

FLOORPLANNING OPTIONS

Below is a list of FLOW SET property names available for the auto floorplan recipe.

If you are unsure of the current property values, use the `misc fp_settings` command to display all the current values.

Property Name & Usage	Description
fp_type <congestion,assign>	Floorplanning priority for different scenarios. Default: congestion (assign for Prototyping).
fp_timeout <integer, in minutes>	Maximum time allowed for floorplan generation. Default: 60 minutes.
fp_maxdsp_limit <percentage 1-default>	Highest percentage of DSPs per partition. Default: 100/num_slr/2.
fp_maxlut_limit <percentage 1-default>	Highest percentage of LUTs per partition. Default: 100/num_slr/2.
fp_maxramb18_limit <percentage 1-default>	Highest percentage of RAMB18 per partition. Default: 100/num_slr/2.
fp_maxramb36_limit <percentage 1-default>	Highest percentage of RAMB36 per partition. Default: 100/num_slr/2.
fp_minlut_limit <percentage 0 - 100>	Lowest LUT size of instances to be used for floorplanning. Default: 0.
fp_hier_limit <integer 1-8>	Deepest hierarchical depth to explore for floorplanning. Default: 3. Applies only to fp_type = congestion.
fp_cong_lutsize <integer percentage>	Instance LUT utilization must be greater than this number to be floorplanned. Default: 0. Applies only to fp_type = congestion.
fp_blacklist_instances	Ignore specified instances. Default: None. Applies only to fp_type = congestion.
fp_instances_limit <integer 1-5>	Number of significant instances to be selected. Default: 2. Applies only to fp_type = congestion.
fp_num_workers <integer 1-8>	Number of threads to use when generating floorplans (affects generation time). Default for full: 1, default for half: 8. Applies only to fp_type = assign.
fp_skip_oversize_instances <true,false>	Set to true to skip instances which are too big for the intended floorplan regions, instead of error-ing out. Default: false. Applies only to fp_type = assign.
fp_max_instances <integer 1-200>	Maximum number of instances for floorplanning. Default: 200. Applies only to fp_type = assign.
fp_max_utilization_percentage <float 0.0-1.0>	Fill regions to the specified percentage point. Default: 1. Applies only to fp_type = assign.
fp_custom_half_x_split <integer 1-region_column_limit>	Number of columns to use for the left half of a floorplan region. If set, custom strategies will be generated using this half region split. Default: None. Applies only to fp_type = assign.
fp_crossing_ratio <integer > 1>	The maximum crossing ratio between each region pair, used to balance out crossings. Default: empty. Applies only to fp_type = assign.

41.4 FLOW_STEPS

Allows execution of individual steps in the InTime flow.

Argument	Description
analyze_parent_revision	Analyze the parent revision of the current project.
download_results	Download outstanding results for the current job.
finalize_job	Finalize the current job.
generate_strategies	Generate a set of goal orientated strategies and apply them to the current project.
initialize_job	Initialize a new job.
learn	Learn from the results in the current result set and tag the outcome with the current job id.
post_recipe_analysis	Perform analysis on all results generated during the last recipe.
prepare_training_data	Analyze the runs database and fill active result set with data required for learning.
run_strategies	Run all strategies generated using flow_steps generate_strategies.

41.5 JOB

Operations on existing jobs

Argument	Description
cancel <remote_job_id> <run_target>	Cancel the specified remote job.
config <local_job_id> <field>	Prints the flow config field of the specified job.
summary <local_job_id>	Download results for the current job.

41.6 LICENSE

License management functions and displays the current license file for InTime.

Argument	Description
details	Display details about the current license file registered for InTime (if any).
file_name	Return the file name of the current registered license file for InTime (if any).
register <license_file>	Register a new InTime license file.
reset	Deregister the current license file for InTime (if any).
run_target <run_target>	Check if the specified run target is available under the current license.

41.7 MISC

Miscellaneous helper functions

Argument	Description
clean_db	Cleans the database of orphan records caused by results download, import, export and sudden termination.
examples_path <toolchain>	Return the path where example projects are extracted to by default. The toolchain is optional.
exec_mode	Return the execution mode of InTime. Possible values: <console>, <batch>, <gui>
find_path <options>	Return the directory where the files below are saved. Possible options: <scripts> <recipes> <user_recipes> <intime_log> <user_home> <dot_plunify> <dot_plunify_user> <session_tmp_dir> <project_dir> <runs_db>
gen_connect <job id> <revision name>	Generate the required files for Connectivity Graph Analysis.
get auto_pilot_template_dir	Show the active auto pilot templates directory.
get grid	Show the compute grid mode.
get runs_db	Show the active mode of the runs database.
get custom_jobs_dir	Get the custom runs job directory.
get clean_schedule	Show the list of files to be cleaned.
get sshagent	Show the sshagent status.
overfit -force	Generate settings for overfit mitigation in every job.
printenv	Print the active process environment.
set auto_pilot_template_dir <value>	Set the auto pilot templates directory.
set auto_import <value>	Turn on or off auto import for a new project. Supported values: <true> <false>
set custom_jobs_dir <dir>	Set a custom jobs directory for temporary files when the InTime job is running.
set grid <mode>	Set the compute grid mode. Supported modes: <lsf> <pbs> <sge> <sshagent> lsf - Load Sharing Facility pbs - Portable Batch System sge - Sun Grid Engine sshagent - Using SSH method.
set sshagent enable <value>	Enable sshagent mode and set the computenodes. Supported values: A comma-separated list of IP Addresses or hosts.
set sshagent disable	Disable sshagent mode.
set user_args <value>	Set the USER_ARGS value. For instance, to set a particular resource queue.
set runs_db <value>	Change the runs database to use project mode or user mode. Possible values: <project>, <user>.
set_path <user_recipes> <new_path>	Set the specified directory for user-defined recipes.
set_stdout <level>	Control messages forwarded to stdout when running in tcl/batch modes. Supported levels: <all> <tcl>

Argument	Description
settings get <scope> <key> -nofail	<p>Get the value of a key in the ini file.</p> <p>-nofail - Do not fail when the specified setting does not exist.</p> <p>Supported scopes: <global> <user></p> <p>Note: Global scope refers to the plunify.ini file found in the .plunify directory. User scope refers to the intime.ini file found in <user>_<mac address> directory.</p> <p>Example: To find the InTime server's IP Address</p> <pre>misc settings global intime_agent/ip -nofail</pre>
settings set <scope> <key> <value>	<p>Set the <i>value</i> of the <i>key</i> in the ini file.</p> <p>Supported scopes: <global> <user></p> <p>Note: Global scope refers to the plunify.ini file found in the .plunify directory. User scope refers to the intime.ini file found in the <user>_<mac address> directory.</p>
scripts_path	Display the scripts path.
recipes_path	Display the recipes path.
update_json <path> <key> <value>	<p>Update the json file specified in path.</p> <p>Supported keys concurrent_runs, runs_per_round, strategy_max_runtime. Only positive numeric value are allowed.</p>

41.8 PROJECT

Details and control of the open project.

Argument	Description
clear_history	Clear the complete history of all jobs that have been run on the current project for your InTime runs database.
close	Close the current project.
exec <command>	Execute <command> using the active project's vendor shell.
extract <archive> <dest_dir> - toolchain <toolchain> - toolchain_version <toolchain_version> -overwrite	Extract the vendor archive to the directory specified.
design_tag <value>	Set the specified value as the current project's design tag.
design_tag clear	Delete the current project's design tag.
history	Print a history of all jobs that have been run on the current project.
info <options>	Please refer to info command.
is_open	Return 1 if a project is currently open, 0 otherwise.
open <project_file> -toolchain <toolchain> -toolchain_version <specific version,from_last_session>	Open the specified project file. The -toolchain argument is required for certain projects. The -toolchain_version argument is optional.
open_dir <project_dir> -toolchain <toolchain> -toolchain_version <specific version, from_last_session>	Search for a known project file in the specified path, and if found, open it. The -toolchain argument is required for certain projects. The -toolchain_version argument is optional.
open_example <toolchain> <dest_dir> -overwrite	Extract and open an example for the specified toolchain, the dest_dir is optional. Supported toolchains: QuartusII,QuartusPP,ISE,Libero,Vivado,Vivado_dcp,Vivado_tcl,Vivado_xpr
open_last	Open the last-opened project
setting_filters	List settings in the current project's specified Setting Filters.
setting_filters <type> add <setting_name> <value> -step <step>	Add the specified setting to the specified list, with <value> being optional (except for locklists).
setting_filters <type> clear	Clear the specified Settings Filter.
setting_filters <type> contains <setting_name> <value> -step <step>	Check if specified setting is contained in the specified list, with <value> being optional (except for locklists).
setting_filters <type> remove <setting_name> <value> -step <step>	Remove the specified setting from the specified list, with <value> being optional (except for locklists).
setting_filters apply_template <file_path>	Apply the setting filters from the specified Setting Filters template. Template is applied to project's current setting filters, clear first to load template as is.
setting_filters available_settings	List settings which can be used in the Settings Filter for the current project.
setting_filters clear <all, id_only, id_value_only>	Clear all Setting Filters in the current project. Defaults to all.
setting_filters load_template <file_path>	Clear the project's existing Setting Filters and load template as is.

Argument	Description
setting_filters save_template <file_path>	Save the current Setting Filters to a Setting Filters template file.
setting_filters verify	

PROJECT INFO

Returns information about the project. This is to be used with the **Project** command, e.g. `project info`

Argument	Description
all_job_ids	Return a list of all previously ran job ids on this project.
default_revision	Return the default revision in the current project.
design_tag	Return the current project's design tag.
device <family,package,speed,part>	Return the current project's device details.
directory	Return the current project directory.
file_name	Return the current project file's path.
find_shadowed_result_job_id <strategy_name> <job_id>	Return the shadowed result's job id for the given result id.
first_job_id	Return the job id of the first job ran on this project.
last_job_id	Return the job id of the last job ran on this project.
local_to_remote_job_id <job_id>	Return the remote job ID for the specified local job ID.
name	Return the name of the current project.
next_job_id <ref_job_id>	Return the job id of the next job after the specified <ref_job_id> ran on this project.
previous_job_id <ref_job_id>	Return the job id of the previous job before the specified <ref_job_id> ran on this project.
private_cloud_worker_path	Return the directory of the private cloud worker job path.
remote_to_local_job_id <job_id>	Return the local job ID for the specified remote job ID.
revisions	Return a list of all revisions in the current project.
toolchain	Return the toolchain of the current project (in lowercase).
toolchain_version	Return the toolchain version of the current project.
vendor	Return the vendor of the current project (in lowercase).

41.9 RESULTS

Provides details about the current results set

Argument	Description
activate_tcl_set <set_name>	Activate specified results set for future Tcl commands.
add all	Add all results in the runs database to the current result set.
add job <job_id> <run_target> -r	Add the results of a specific job to the current results set. The run target defaults to <local>. Add
add last_job	Add the results of the last job to the current results set.
add project_history	Add all results in the current project history to the current result set.
add single <strategy_name> <job_id>	Add the single result specified to the current results set.
add training_data	Add all results in the runs database matching the training data filter to the current result set.
assess_design	Reads existing design information and generates an analysis of the placement, routing and timing challenges, if any.
bottleneck <-active,-parent> <detail_level>	Generate a design bottleneck report for the specified result(s). ** Supported detail levels:** -net <number of data paths, number of source clock paths, number of destination clock paths>, -paths <number of paths>
count_duplicates <local_job_id> -r	Count the number of duplicate strategies inside the specified job.
current_tcl_set_name	Return the name of the current Tcl set name.
download <job_id> <run_target> <-wait> <-overwrite>	Get the results of the job specified by <job_id> and <run_target>. With -wait, InTime waits for the remote job to complete if it is still busy. With -overwrite it downloads the results even if it is available locally. This action overwrites values in the database with the downloaded values and the chosen job and is irreversible.
epaf_download <remote_job_id>	Get the epaf files <remote_job_id>
export <filename> <format>	Export all results in current results set in either CSV, HTML or JUnit format. Default is -results_csv. Supported formats: -results_csv, -criticalpath_html, -junit_xml, -local_db, -server_db. If -server_db is selected, a filename is not required.
extract <root,strategy name> <job_id>	Find the designated result's netlist and extract results from it. If root is specified, the Job ID is not required.
goal_met	Return 1 when the goal was met within the current results set, 0 otherwise
import -local_db <filename>	Import from external database file. A filename for the data source is required.
import -server_db <options> -n <records> -designtag <tag value>	Import from InTime Server database. Supported options: <-all>, <-success>. <records> - Number of records to import. Default is 50. <tag value> - This is the design tag. Only records with the same design tag will be imported.
import job_dir <job_dir> <parent_revision_name>	Import and create a new job with all results in specified directory. <parent_revision_name> specifies which of the found revisions must be the parent of the new job.
import remote_job <remote_run_target> <remote_job_id> <parent_revision_name>	Import and create a new job with all results from specified remote run target. Possible remote run target values: <plunify_cloud> <parent_revision_name> specifies which of the found revisions must be the parent of the new job.
package_logs <log_path>	Archive the session log, job logs and revision logs in the current results set to intimelogs_yyyy

Argument	Description
remove all	Remove all results from the current results set.
remove job <job_id> <run_target> -r	Remove the results of a specific job from the current results set. The run target defaults to <local>. Add -r to remove results recursively.
restore_default_tcl_set	Restore the results set used for Tcl commands to the result set linked to the InTime user interface.
summary <match_expr> <detail_level> <type> <metric> <-id>	Lists results in the current results set that match the match expression. Supported match expressions: all, best, best_including_estimates, busy, failed, not_started, pending, stopped, success, top3, top3_including_estimates, top10, top10_including_estimates, worst, worst_including_estimates (Default: all). Supported detail levels: -brief, -clocksonly, -count, -errors, -list, -preview, -verbose (Default: -brief). Supported types: -all_types, -leaf, -parent, -root (Default: -all_types). Supported metric: wns, tns, area, power (Default: goal value) Supported id: -id

41.10 RUN_TARGET

Used for configuring and testing run_target. Available run targets: <local> <private_cloud> <plunify_cloud>

Argument	Description
set <run_target> <parameter> <value>	Test the configuration of remote run targets.
test_connection <run_target>	Test the configuration of remote run targets.

41.11 STRATEGY

Provides details of the currently active strategy/result

Argument	Description
export <target_file> <options>	Export the specified information for this strategy. Supported options: -results_csv, -script_tcl, -summary_xml
results <options>	Filter the results in this strategy based on the options. Default is -brief. Supported options: -brief, -verbose, -errors, -field <field name>. The -field option returns only value for that particular field. Supported field names: These options are valid only with the *-field option. Job Strategy "Met Goal" TNS "Worst Slack" Area Power Runtime "Current Action" "Run State" "Run Target" "Remote Job ID" Tag FMax "Total -ve Setup" "Worst Setup" "Total Setup FEP" "Total -ve Hold" "Worst Hold" "Total -ve Pulse Width" "Worst Pulse Width" "PP TNS" "PP Worst Setup" "clocks" For the "clocks" field name, a list of the clock frequencies will be displayed.
set_active <revision_name> <job_id>	Open the specified strategy, setting it as the active strategy for all other strategy commands.
settings <options>	Provide details about the settings in this strategy. Default is -all. Supported options: -all, -non_default, -default, -list_all, -list_non_default, -list_default, -count
tag remove	Remove a tag from an active strategy
tag set <tag_value>	Add a tag to an active strategy
unset_active	Unset whatever strategy was previously set with the set_active command.

41.12 VENDORS

Allows configuration of vendor tool settings. Example:

vendors auto_detect

Argument	Description
auto_detect	Auto-detect vendor toolchains installed on this machine.
current_path	Return the installation path of the toolchain version of the current project.
current_toolchain	Return the toolchain for the current project.
current_vendor	Return the vendor for the current project.
current_version	Return the toolchain version of the current project.
enable_vendor_backend <vendor_name> <vendor_toolchain> <project_directory>	Enable the specified vendor backend for vendor-specific operations even when a project is not open.
fetch_global_config <-force>	Fetch toolchains configured in the current InTime private cloud environment.
get_default <vendor> <toolchain>	Get the default version to use for the specified vendor toolchain.
register synth_tool synplifypro <path_containing_tool_executable>	Register a new Synplify Pro tool configuration. Specify the path up to and excluding the tool executable.
register <vendor_name> <toolchain> <install_path> <license_file> -category <category> -version <version>	Register a new vendor configuration. If no <toolchain_version> is provided, the version will be auto-detected.
set_default <vendor> <toolchain> <default_version>	Set the default version to use for the specified vendor toolchain.
summary	Print a summary of all configured vendor environments.
unregister -all	Deregister all existing vendor configurations.
unregister synth_tool synplifypro	Deregister the existing Synplify Pro tool configuration.
unregister <vendor_name> <toolchain> <toolchain_version>	Deregister an existing vendor configuration.
update <install_path,license_file,category> <vendor_name> <toolchain> <toolchain_version> <new_value>	Update the installation or license file path of a registered environment.
versions <vendor> <toolchain>	Return a list of all registered versions for the specified vendor toolchain.

42. Release Notes

For the latest release notes, please refer to <https://support.plunify.com/en/intime-release-notes/>

For older release notes, please refer to <https://support.plunify.com/en/intime-release-notes/>

43. Security Vulnerabilities Updates

43.1 Plunify Support Portal

Plunify posts updates, advisories, and patches on <https://support.plunify.com>. Software licensees can access the latest information on vulnerabilities and security updates on the Support Portal.

43.2 InTime Release Notes and Documentation

Plunify posts software release notes at <https://support.plunify.com/en/intime-release-notes/> Security vulnerabilities are documented in the release notes that accompany software updates. Detailed technical documentation may also be provided to help licensees understand and mitigate the vulnerabilities.

Example of a **Plunify Security Vulnerabilities notice**

<https://support.plunify.com/en/knowledgebase/plunify-security-statement-cve-2021-44228-apache-log4j-vulnerability/>

44. Software Support and Maintenance

44.1 End Of Life (EOL) Cycle of Software for Linux

Our software is tied to the AlmaLinux release cycle, which follows the RHEL lifecycle, ensuring stability and long-term support. Our software releases also follow the supported Operating Systems (OSs) from EDA/FPGA vendors' tools.

Support Portal: Plunify posts EOL updates, advisories on <https://support.plunify.com>. Software licensees can access the latest information on EOL.

44.2 EDA/FPGA Vendor Tools Supported OSs

Vivado: <https://docs.amd.com/r/en-US/ug973-vivado-release-notes-install-license/Requirements-and-Setup>

Quartus Prime: <https://www.intel.com/content/www/us/en/support/programmable/support-resources/design-software/os-support.html>

Libero: https://coredocs.s3.amazonaws.com/Libero/2024_1/Tool/libero_soc_v2024_1_release_notes.pdf

44.3 Support EOL

- CentOS/RHEL 6 is supported until November 2020.
- CentOS/RHEL 7 is supported until June 2024.
- AlmaLinux 8.x is supported until 2029.
- AlmaLinux 9.x is expected to be supported until 2029, aligning with RHEL 9.x.

For example, AlmaLinux 8.10, based on RHEL 8.x, will reach its EOL in 2029. Therefore, our software on AlmaLinux 8.x will remain supported until then.

44.4 Action Required

To maintain support and security, plan upgrades accordingly. For software running on AlmaLinux 8.x, consider migrating to AlmaLinux 9.x to ensure continued compatibility and support before 2029.

44.5 Security Implications

Using unsupported AlmaLinux versions poses significant security risks. Regular updates and timely upgrades are crucial to protect against vulnerabilities and ensure system stability.

By aligning with AlmaLinux's release and support schedule, we can ensure our software remains secure, up-to-date, and fully supported.

Red Hat Linux Life Cycle

<https://access.redhat.com/support/policy/updates/errata>

Ubuntu Linux Life Cycle

<https://ubuntu.com/about/release-cycle>

Windows Life Cycle

<https://learn.microsoft.com/en-us/lifecycle/products/windows-10-home-and-pro> <https://learn.microsoft.com/en-us/lifecycle/products/windows-11-home-and-pro>

Plunify InTime EOL notice

<https://support.plunify.com/en/knowledgebase/centos-6-eol-support/> <https://support.plunify.com/en/knowledgebase/eol-for-rhel-centos-7-support/>

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Qt Toolkit

QtWebsocket

QtWebApp HTTP Server

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Version 3, 29 June 2007

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libqgit2

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This option is useful when you wish to copy part of the code of the Library into a program that is not a library.

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Definitions for data structures and routines for the regular expression library.

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45.13 Perl5

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45.18 xkbcommon

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and semantics are as close as possible to those of the Perl 5 language.
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 "A generic solution to polygon clipping"

Communications of the ACM, Vol 35, Issue 7 (July 1992) pp 56-63.
<http://portal.acm.org/citation.cfm?id=129906>

Computer graphics and geometric modeling: implementation and algorithms
 By Max K. Agoston
 Springer; 1 edition (January 4, 2005)
<http://books.google.com/books?q=vatti+clipping+agoston>

See also:
 "Polygon Offsetting by Computing Winding Numbers"
 Paper no. DETC2005-85513 pp. 565-575
 ASME 2005 International Design Engineering Technical Conferences
 and Computers and Information in Engineering Conference (IDETC/CIE2005)
 September 24-28, 2005 , Long Beach, California, USA
<http://www.me.berkeley.edu/~mcmains/pubs/DAC05OffsetPolygon.pdf>

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Chris Colbert began the Kiwi project in December 2013 in an effort to create a blisteringly fast UI constraint solver. Chris is still the project lead.

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pandas

1.1.1

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20.2.3

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pycryptodome

3.9.8

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pyparsing

2.4.7

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python-dateutil

2.8.1

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dateutil - Extensions to the standard Python datetime module.

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pytz

2020.1

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scikit-learn

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setuptools

41.2.0

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six

1.15.0

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threadpoolctl

2.1.0

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umap-learn

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Pyvis

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