

# Getting Started With Manifold

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## Introduction

This is a quick-start guide that provides instructions on how to build Manifold and run simulations in just a few steps. More details on how to use Manifold can be found in the *Manifold User Guide*, available at <http://manifold.gatech.edu/documentation>.

Part I below describes the generic process of constructing the Manifold infrastructure which includes four main code infrastructures – i) microarchitecture component models (e.g., cores and caches), ii) simulation management kernel and supporting functions like linking component models, iii) Energy Introspector (EI) modeling library with power, thermal, energy, and reliability models, and iv) the QSim front-end multicore emulator.

Part II describes the steps for constructing the specific simulators that are included in the distribution package. Note that this guide gets you quickly to a 16 core full system x86 model or a 32 core full system x86 model. We have tested these models on the PARSEC and SPLASH benchmarks. All of the benchmarks were executed by fast forwarding for 100M cycles and then executing the region of interest for 200M cycles. These executions are stable. Of course once you build these simulators, it is easy to swap out components to build other simulators, different configurations, or larger or smaller configurations.

The simulators in this guide do not use EI. Therefore building EI is not covered. To use EI, refer to the document *Getting Started with Energy Introspector*.

## Part I: Build Manifold Infrastructure

### Download and Install QSim

If you choose to run simulations with QSim server or QSim library, you need to install QSim first. Please refer to *Manifold User Guide* for instructions on how to download and install QSIM.

### Build Manifold

Note that in the following the 0.12 release is used as an example. Your release may be different.

1. Uncompress the distribution package, e.g., manifold-0.12.tar.gz.

```
tar xvfz manifold-0.12.tar.gz
```

## 2. Build Manifold.

```
cd manifold-0.12
./configure
make
```

## Part II: Build and Run Simulators

Simulations can be run with QSim server, QSim library, or trace files. You can choose any method to run.

### Run Simulations with QSim Server

QSim server can be used to run parallel simulations.

#### 1. Build simulator

```
cd simulator/smp/QsimClient
make
```

2. Start QSim server (see User Guide); must use state.16 for 16-core model and state.32 for 32-core model, and so on.

3. Run simulator in simulator/smp/QsimClient

3a. Run simulation on 16-core model, assuming QSim server is running on localhost and port is set to 12345

```
mpirun -np 18 ./smp_llp ../config/conf4x5_torus_llp.cfg localhost 12345
```

3b. Run simulation on 32-core model.

```
mpirun -np 37 ./smp_llp ../config/conf6x6_torus_llp.cfg localhost 12345
```

## Run Simulations with QSim Library

QSim Libaray can only be used to run sequential simulations.

### 1. Build simulator

```
cd simulator/smp/QsimLib
make
```

### 2. Run simulator in simulator/smp/QsimLib

NOTE: <PATH> is the path for your QSim state files.

<PATH2> is the path for your benchmark.

<benchmark> is the benchmark tar file, e.g., ferret.tar.

#### 2a. Run simulation on 16-core model

```
mpirun -np 1 ./smp_llp ../config/conf4x5_torus_llp.cfg <PATH>/state.16
<PATH2>/<benchmark>
```

#### 2b. Run simulation on 32-core model.

```
mpirun -np 1 ./smp_llp ../config/conf6x6_torus_llp.cfg <PATH>/state.32
<PATH2>/<benchmark>
```

## Run Simulations with Trace Files

Trace files can be used to run parallel simulations.

### 1. Build simulator

```
cd simulator/smp/TraceProc
make
```

### 2. Run simulator in simulator/smp/TraceProc

NOTE: <PATH> is the path for the trace files.

<BASENAME> is the common part of the trace file names. For example, if trace files are named foo\_0, foo\_1, ..., foo\_15, then foo\_ is the BASENAME.

#### 2a. Run simulation on 16-core model

```
mpirun -np 18 ./smp_llp ../config/conf4x5_torus_llp.cfg <PATH>/<BASENAME>
```

2b. Run simulation on 32-core model.

```
mpirun -np 37 ./smp_llp ../config/conf6x6_torus_llp.cfg <PATH>/<BASENAME>
```