

# OpenPiton in Action

Princeton University

<http://openpiton.org>



OpenPiton

# Introduction

# What to download?

- RTL, scripts, documentation, cross-compiler, FPGA disk images & FPGA bit files:
  - Grab the latest from <http://openpiton.org>
- Linux kernel for OS development:
  - <https://github.com/PrincetonUniversity/piton-linux>
- Hypervisor:
  - <https://github.com/PrincetonUniversity/piton-sw>
- Power Characterisation & Piton PCB:
  - [http://www.openpiton.org/piton\\_power\\_char.html](http://www.openpiton.org/piton_power_char.html)
  - [http://www.openpiton.org/piton\\_pcb.html](http://www.openpiton.org/piton_pcb.html)

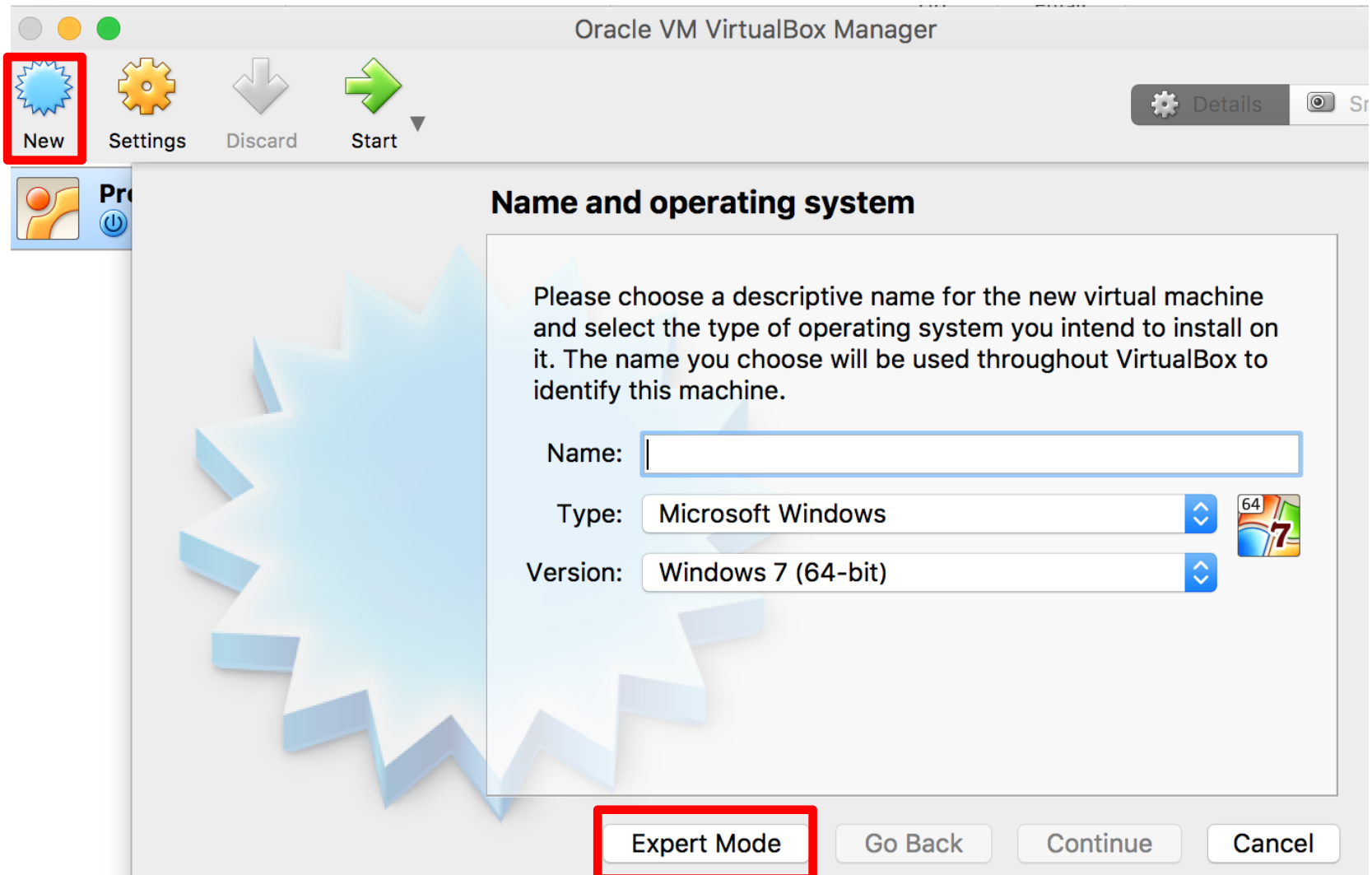
# Environment setup - Tools

- OS: Ubuntu 16.04, Springdale (Red Hat) 6.6
- VCS: vcs\_mx\_L-2016.06
- Vivado: 2015.4 and newer
- Synopsys Design Compiler: syn\_I-2013.12-SP4
- Synopsys IC Compiler: icc\_I-2013.12-SP4
- Cadence Incisive Unified Simulator 08.20-s028
- Icarus Verilog 10.1.1
  
- All other tool versions are listed on <http://openpiton.org>

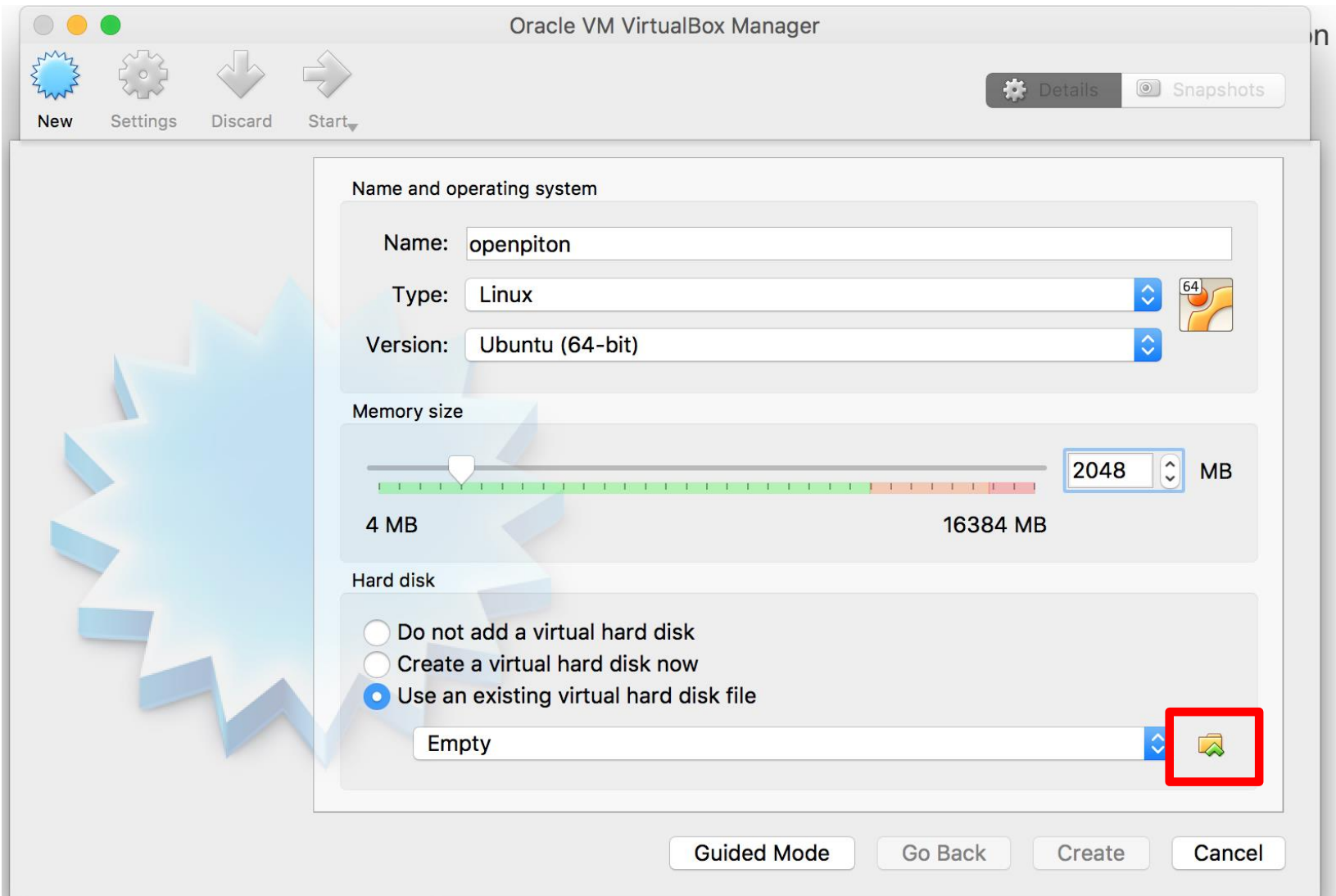
# Environment setup - Paths

1. Source required tool scripts
  - VCS, Vivado, etc
2. `$PITON_ROOT`
  - Should point to the root directory of your piton install
3. `$PITON_ROOT/piton/piton_settings.bash`
  - Source before running any simulations

# Hands-on: Import VM



# Hands-on: Import VM



# Hands-on: Environment setup

## 1. Start VM and log in

1. Username: openpiton
2. Password: asplos2018

## 2. Open LXTerm on Desktop

### 3. export

```
PITON_ROOT=/home/openpiton/Desktop/openpiton
```

### 4. cd \$PITON\_ROOT

### 5. source \$PITON\_ROOT/piton/piton\_settings.bash



**Where is everything?**

# \$PITON\_ROOT

- `piton/`
  - Aliased to `$DV_ROOT`
  - Home to RTL, tools, assembly tests
- `build/`
  - Aliased to `$MODEL_DIR`
  - Temporary build files, files from FPGA flow
- `docs/`
  - Documentation as seen on <http://openpiton.org>

# piton/

- `design/`
  - Top level of the RTL module tree
  - Structure follows verilog module hierarchy
- `tools/`
  - Home to all simulation, synthesis, FPGA tools
- `verif/`
  - Location for all verification-related files

# Useful Paths

- **Where's the RTL?**
  - `piton/design/*/rtl/`
- **Where are the assembly test cases?**
  - `piton/verif/diag/assembly/`
- **Where are the module-agnostic backend scripts?**
  - **FPGA:** `piton/tools/src/proto/`
  - **ASIC:** `piton/tools/synopsys/`
- **Where are the module-specific backend scripts?**
  - **FPGA:** `piton/design/*/xilinx/`
  - **ASIC:** `piton/design/*/synopsys/script/`

# What can I do with OpenPiton?

- Simulation
- ASIC Synthesis & Backend
- FPGA Synthesis & Backend
- Validation
- Configuration
- OS/Hypervisor Development

# Documentation

- Microarchitecture Specification
  - Specification of uncore microarchitecture
- Simulation Manual
  - How to use, add to simulation infrastructure
- Synthesis and Back-end Manual
  - Details infrastructure, how to run flows, porting
- FPGA Prototype Manual
  - Details infrastructure, implementation, porting