OpenPiton+Ariane: The RISC-V Hardware Research Platform

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http://openpiton.org
http://pulp-platform.org

Introduction

What to download?

- RTL, scripts, documentation, FPGA disk images & FPGA bit files:
  - Download from http://openpiton.org
- OpenPiton GitHub:
  - https://github.com/PrincetonUniversity/openpiton.git
- Ariane GitHub:
  - https://github.com/pulp-platform/ariane
- Linux kernel for OS development:
  - https://github.com/pulp-platform/ariane-sdk

Environment setup - Tools

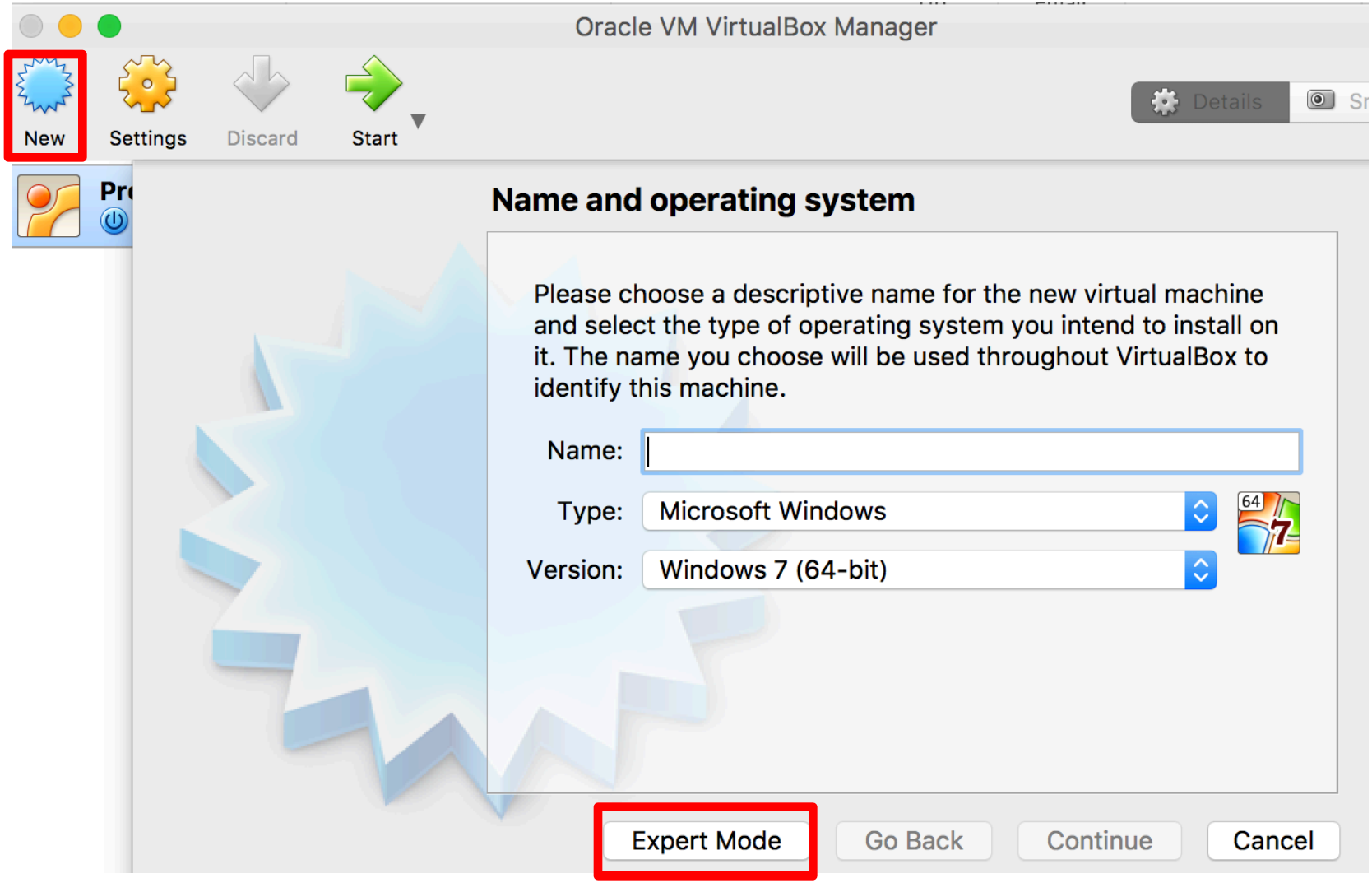
Category	Tool/Platform	Tested Version
OS	Ubuntu	16.04, 18.04
	Red Hat	6.6, 7
Simulator	Synopsys VCS	vcs_mx_L-2016.06
	Mentor ModelSim	10.6b
	Verilator	4.014
FPGA	Xilinx Vivado	2018.2
ASIC	Synopsys Design Compiler	syn_I-2013.12-SP4
	Synopsys IC Compiler	icc_I-2013.12-SP4

- All other tool versions are listed on http://openpiton.org

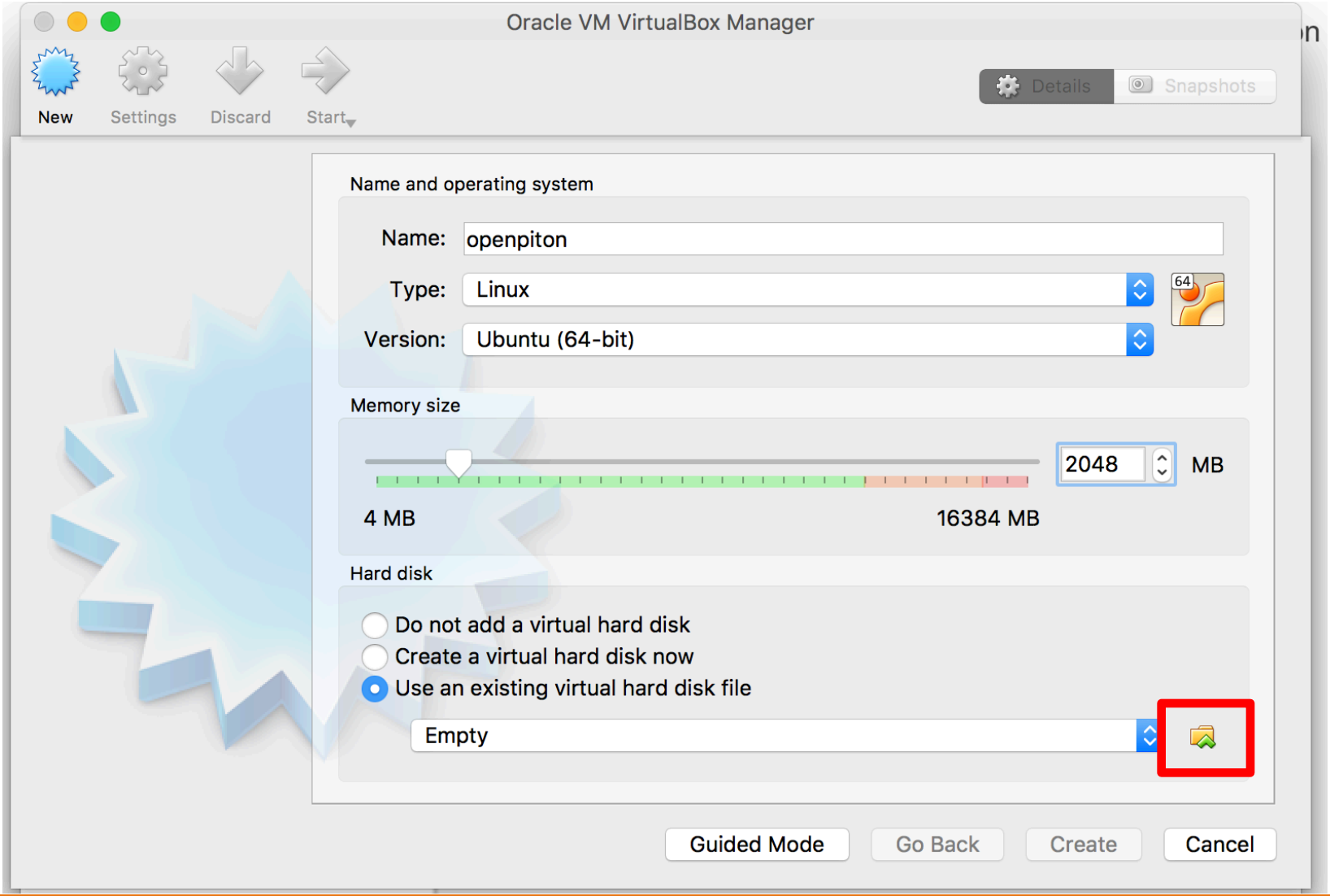
Environment setup - Paths

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/ariane_setup.sh`
   - Sets initial OpenPiton+Ariane environment variables
4. `$PITON_ROOT/piton/ariane_build_tools.sh`
   - Builds RISC-V tools, compiles tests

Hands-on: Import VM



Hands-on: Import VM



Hands-on: Environment setup

1. Start VM and log in
    1. Username: openpiton
    2. Password: openpiton
2. Open LXTerm on Desktop
3. `cd $PITON_ROOT`
4. `source $PITON_ROOT/piton/ariane_setup.sh`

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
  - Ariane submodule located under: piton/design/chip/tile/ariane
- 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+Ariane?

- Simulation
- ASIC Synthesis & Backend
- FPGA Synthesis & Backend
- Validation
- Configuration
- OS 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