system builder library

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Contents

1 Usage

1.1 Introduction

System build is a library that will parse a yaml project file, and a yaml command file to generate a list of commands to execute in threads. These can be concurrent or singular in fashion.

1.2 Dependencies

The following are the dependencies of the cores.

- python 3.X
- python progressbar2

1.3 Example Creator

The creator is responsable for instantiating the library, preparing the project, and launching the system builder library to build the project.

```
from system.build import *

cmd_compiler = commandCompiler("projects.yml", "commands.
    ↪ yml")

cmd_compiler.create()

projects = cmd_compiler.getResult()

cmd_exec = commandExecutor(projects, args.dryrun)

cmd_exec.runProject()
```

1.4 Example Commands Yaml file

This yaml file is injested so commands are executed with certain steps for the final end product.

```
fusesoc:
  cmd_0: ["__CHECK_SKIP__{_pwd}/output/hdl/{_project_name
      ↪ }/AFRL_project_veronica_axi_baremetal_1.0.0.bit"]
  cmd_1: ["fusesoc", "--cores-root", "{path}", "run", "--
      ↪ build", "--work-root", "output/hdl/{_project_name
      ↪ }", "--target", "{target}", "{project}"]
script:
```

```
  cmd_1: ["{exec}", "{file}", "{_project_name}", "{args}"
      ↪ ]
gcc_riscv32:
  cmd_0: ["__CHECK_SKIP__{_pwd}/output/bin/riscv/bin/
      ↪ riscv32-unknown-elf-gcc"]
  cmd_1: ["make", "-C", "{_pwd}/{path}", "clean"]
  cmd_2: ["__CWD__{_pwd}/{path}", "./configure", "--
      ↪ prefix={_pwd}/output/bin/riscv", "--disable-linux
      ↪ ", "--with-arch=rv32imac", "--with-abi-ilp32"]
  cmd_3: ["make", "-C", "{_pwd}/{path}", "-j", "8"]
openocd_riscv:
  cmd_0: ["__CHECK_SKIP__{_pwd}/output/bin/openocd/bin/
      ↪ openocd"]
  #cmd_1: ["__CWD__{_pwd}/{path}", "git", "apply", "--
      ↪ ignore-whitespace", "../patch/pmpregs.patch"]
  cmd_2: ["__CWD__{_pwd}/{path}", "./bootstrap"]
  cmd_3: ["__CWD__{_pwd}/{path}", "./configure", "--
      ↪ prefix={_pwd}/output/bin/openocd", "--enable-ftdi
      ↪ ", "--enable-dummy", "--enable-jtag_vpi"]
  cmd_4: ["make", "-C", "{_pwd}/{path}", "-j", "8"]
  cmd_5: ["make", "install", "-C", "{_pwd}/{path}"]
fpga_baremetal_examples:
  cmd_0: ["__CHECK_SKIP__{_pwd}/output/apps"]
  cmd_1: ["mkdir", "-p", "{_pwd}/{path}/cmake"]
  cmd_2: ["__CWD__{_pwd}/{path}/cmake", "__ENV_PATH__{
      ↪ _pwd}/output/bin/riscv/bin/", "cmake", "../", "-
      ↪ DCMAKE_RUNTIME_OUTPUT_DIRECTORY={_pwd}/output/
      ↪ apps", "-DCMAKE_PREFIX_PATH={_pwd}/output/bin/
      ↪ riscv/bin/", "-DBUILD_EXAMPLES_ALL=ON", "-
      ↪ DCMAKE_TOOLCHAIN_FILE={_pwd}/{path}/arch/riscv/
      ↪ riscv.cmake"]
  cmd_3: ["__ENV_PATH__{_pwd}/output/bin/riscv/bin/", "
      ↪ make", "-C", "{_pwd}/{path}/cmake"]
buildroot:
  cmd_1: ["rm", "-rf", "{_pwd}/output/linux/{
      ↪ _project_name}"]
  cmd_2: ["make", "-C", "{path}", "distclean"]
  cmd_3: ["make", "O={_pwd}/output/linux/{_project_name}"
      ↪ , "-C", "{path}", "{config}"]
  cmd_4: ["make", "O={_pwd}/output/linux/{_project_name}"
      ↪ , "-C", "{path}"]
genimage:
  cmd_1: ["mkdir", "-p", "{_pwd}/output/genimage/tmp/{
      ↪ _project_name}"]
  cmd_2: ["genimage", "--config", "{path}/{_project_name
      ↪ }.cfg"]
```

1.5 Example Projects Yaml file

This takes the commands and fills out the information required and order of operations for creating the finaly end result project.

```
zed_fmcomms2-3_linux_busybox_sdcard:
  concurrent:
    fusesoc: &fusesoc_fmcomms2-3
      path: hdl
      project: AFRL:project:fmcomms2-3:1.0.0
      target: zed_bootgen
    buildroot: &buildroot_fmcomms2-3
      path: sw/linux/buildroot-afrl
      config: zynq_zed_ad_fmcomms2-3_defconfig
  sequential:
    script: &output_files_fmcomms2-3
      exec: python
      file: py/output_gen.py
      args: "--rootfs output/linux --bootfs output/hdl --
          ↪ dest output/sdcard"
    genimage:
      path: img_cfg
zc702_fmcomms2-3_linux_busybox_sdcard:
  concurrent:
    fusesoc:
      <<: *fusesoc_fmcomms2-3
      target: zc702_bootgen
    buildroot:
      <<: *buildroot_fmcomms2-3
      config: zynq_zc702_ad_fmcomms2-3_defconfig
  sequential:
    script:
      <<: *output_files_fmcomms2-3
    genimage:
      path: img_cfg
```

2 Code Documentation

Natural docs is used to generate documentation for this project. The next lists the following sections.

- **init** python init code
- **builder** system builder library.

- **creator** system builder example code.

__init__.py

AUTHORS

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DATES

2025/03/08

INFORMATION

Brief

builder define for packages

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builder.py

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2025/03/08

INFORMATION

Brief

parse yaml file to execute build tools

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commandCompiler

commandCompiler

Parse yaml files into commands for command executor

FUNCTIONS

__init__

```
def __init__(
self,
yaml_projects
 =
None,
```

```
 yaml_commands
  =
 None,
 target
  =
 None
)
```

Setup class

listCommands

```
def listCommands(
self
)
```

Print a list of all the commands available

listProjects

```
def listProjects(
self
)
```

Print a list of all the

clear

```
def clear(
self
)
```

Clear results of create and current yaml file pointer.

setProjects

```
def setProjects(
self,
yaml_projects
)
```

Set a yaml file for project commands

setCommands

```
def setCommands(
self,
yaml_commands
)
```

Set a yaml file for commands available

create

```
def create(
self,
yaml_projects
  =
None,
yaml_commands
  =
None,
target
  =
None
)
```

Pass a yaml file to use for processing into format for commandExecutor.

getResult

```
def getResult(
self
)
```

Return dict of dicts that contains lists with lists of lists to execute with subprocess {'project': { 'concurrent': [[["make", "def_config"], ["make"]], [["fusesoc", "run", "--build", "--target", "zed_blinky", "::blinky:1.0.0"]]], 'sequential': [[]]}}

_checkTarget

```
def _checkTarget(
self
)
```

_process

```
def _process(
self
)
```

Create dict of dicts that contains lists with lists of lists to execute with subprocess {'project': { 'concurrent': [[["make", "def_config"], ["make"]], [["fusesoc", "run", "--build", "--target", "zed_blinky", "::blinky:1.0.0"]]], 'sequential': [[]]}}

_load_yaml

```
def _load_yaml(
self,
yaml_file
)
```

Internal function that will load the yaml file that contains project commands or commands.

commandExecutor

commandExecutor

Execute commands create from commandCompileris not a valid selection

FUNCTIONS

clear

```
def clear(
self
)
```

Clear state of commandExecutor to init with no values passed

completed

```
def completed(
self
)
```

return a bool if all items have been completed.

failed

```
def failed(
self
)
```

return a bool indicating failure

stop

```
def stop(
self
)
```

Kill and current processes in build threads

setDryrun

```
def setDryrun(
dryrun
 =
False
)
```

Setting to True sets the project run everything up to the subprocess.Popen call, which is skipped.

setProjects

```
def setProjects(
self,
projects
)
```

Set the projects for the executor to build

runProject

```
def runProject(
self,
projects
 =
None
)
```

Call the internal execute method to start calling up each of the projects to build.

_execute

```
def _execute(
self
)
```

Call subprocess as a thread an_gen_build_cmdsd add it to a list of threads for wait to check on. iterate over projects avaiable and execute commands per project

_subprocess

```
def _subprocess(
self,
list_of_commands
)
```

Responsible for taking a list of commands and launching threads concurrently or singurely.

_project_cmd_count

```
def _project_cmd_count(
self,
run_types
)
```

Number of commands in a project.

_thread_exception

```
def _thread_exception(
self,
args
```

```
)
```

Used to kill all threads once one has failed.

_bar_thread

```
def _bar_thread(
self
)
```

Creates progress bar display in terminal for end user display.

creator.py

AUTHORS

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2025/03/08

INFORMATION

Brief

Example program for using system.builder library.

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FUNCTIONS

main

```
def main()
```

main execution function

list_deps

```
def list_deps(
deps_file
)
```

open deps text file and print all executable names.

deps_check

```
def deps_check(
deps_file
)
```

Check each line of txt file programs

submodule_init

```
def submodule_init(
repo
)
```

Make sure submodules have been pulled. If not, pull them.

clean

```
def clean()
```

Clean up folders used for output (output and log)

parse_args

```
def parse_args(
argv
)
```

Parse args for tuning build

logger_setup

```
def logger_setup(
debug
)
```

Setup logger for log file