

# NSSA 220

## Task Automation with Interpreted Languages

### Subprocesses in Python

**Instructor: Dr. Fahed Jubair**  
**RIT DUBAI**

# Review Process

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- A process is an instance of a running program
- When you execute a Linux command, you are creating a process
- When you execute an application (e.g., Zoom, Chrome, Python script), you are creating a process
- Each process has its own memory, i.e., a process cannot access the memory of other processes (e.g., Zoom cannot access the memory allocated for Chrome)

# Subprocess Module

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- In python, the *subprocess* module allows programmers to write code to create and run processes, and retrieve their output
- Common usages of the *subprocess* module in Python:
  - To run Linux (or Windows) commands within Python and retrieve their results
  - To run external executables (Perl, Bash, C++, Java, etc) within Python and retrieve their results
  - To run multiple tasks in parallel

# subprocess.run Method

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- A method for running commands or external executables as a subprocess
- The below example shows how to execute the *pwd* command using the run method

```
import subprocess

result = subprocess.run(["pwd"], capture_output=True, text=True)

print('output:', result.stdout)
print('error:', result.stderr)
```

Note: if you are using Windows,  
then add “shell=True” option



To indicate whether to  
capture the standard  
output and standard error.

To return stdout and stderr  
as a String (otherwise,  
returned as Bytes)

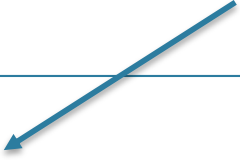
# Running Bash Scripts

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- Let us assume we have the following Bash script
- The below example shows how to execute the bash script using the run method

```
#!/bash/bin
n=$1
for ((i=1; i<=n; i++))
do
echo -n "$i "
done
```

The command to run and its arguments are passed as a list of strings.



```
import subprocess

result = subprocess.run(["bash", "hello.sh", "5"],
capture_output=True, text=True)

print(result.stdout)
print(result.stderr)
print(result.returncode)
```

# Running Python Scripts

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```
import subprocess

result = subprocess.run(["python3", "script.py"], capture_output=True,
text=True)

print(result.stdout)

result = subprocess.run(["python3", "-c", "print([i for i in range(50)])"],
capture_output=True, text=True)

print(result.stdout)
```

# subprocess.call Method

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- Used to run a command in a separate process, and wait for its completion
- Returns the status code

```
import subprocess  
  
return_code = subprocess.call(["python3", "--version"])  
  
print(return_code)
```

# subprocess.check\_output Method

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- Similar to subprocess.run method, except that it only returns the standard output (stdout)

```
import subprocess  
  
output = subprocess.check_output(["python3", "--version"], text=True)  
  
print(output)
```



# Exercise 1

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- Assume you have the below C++ code, called Hello.cpp
- Write a Python script that uses the subprocess module to compile and execute Hello.cpp program, and print the output of the program execution on the screen

```
#include <iostream>

using namespace std;

int main(){
    cout << "C++ is awesome!\n";
    return 0;
}
```

# Exercise 2

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- Repeat exercise 1, however, this time, write a bash script to compile and execute Hello.cpp, and print its output on the screen