

Subprocess Module - Simple Notes

1. subprocess.run()

- Runs a command and waits for it to finish.
- Good for simple use cases.
- Common arguments:
 - args: command to run
 - capture_output=True: saves output in result.stdout / stderr
 - text=True: output becomes normal strings
 - shell=True: run command inside a shell (only when needed)
 - timeout: stop command if it takes too long
 - check=True: raise error if command fails

2. CompletedProcess Object (result of run())

- result.args → command used
- result.returncode → 0 = success, non-zero = error
- result.stdout → captured output (None if not captured)
- result.stderr → captured errors
- result.check_returncode() → raise CalledProcessError if failed

3. Popen (Advanced)

- Gives full control over the process.
- Use when you want:
 - live output
 - send input interactively
 - background processes
 - kill/terminate processes

4. Important Popen arguments

- stdin=PIPE → allows Python to send input to the process
- stdout=PIPE → capture output
- stderr=PIPE → capture errors
- stderr=STDOUT → combine stdout + stderr
- cwd → run in different folder
- env → custom environment variables
- text=True → work with strings

5. Important Popen methods

- poll() → check if finished (None = still running)
- wait() → wait until finished
- communicate(input) → send input + get output safely (best method)
- terminate() → stop process politely
- kill() → force kill process

6. Exceptions

- OSError → command not found
- ValueError → wrong arguments
- CalledProcessError → check=True and command fails
- TimeoutExpired → command took too long
- SubprocessError → base class for all subprocess errors

7. PIPE, DEVNULL, STDOUT

- PIPE → create a pipe to send/receive data
- DEVNULL → ignore output completely
- STDOUT → merge stderr into stdout

8. shell=True (When to use)

- Use only when you need:
 - pipes (|)
 - wildcards (*.txt)
 - commands like 'dir' on Windows

- Otherwise avoid, because of security risks.

9. Text mode vs Binary mode

- Default: binary (bytes)
- `text=True` or `encoding=...` → convert bytes → string
- In text mode: all line endings → '
'

10. Windows STARTUPINFO (only if needed)

- Used to hide command window or set custom handles.
- Common use:
 - Hide console window with `SW_HIDE`
- Normal users rarely need this.