Amirkabir University of Technology
(Tehran Polytechnic)

Operating Systems

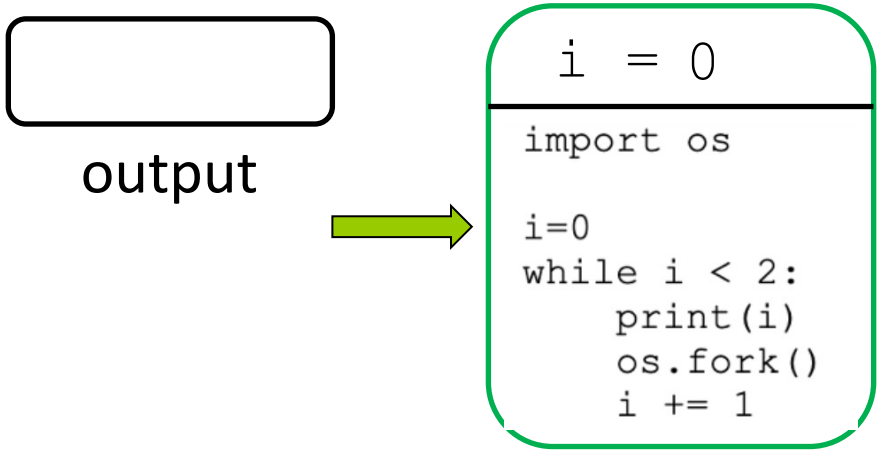
Processes-Part3

Seyyed Ahmad Javadi

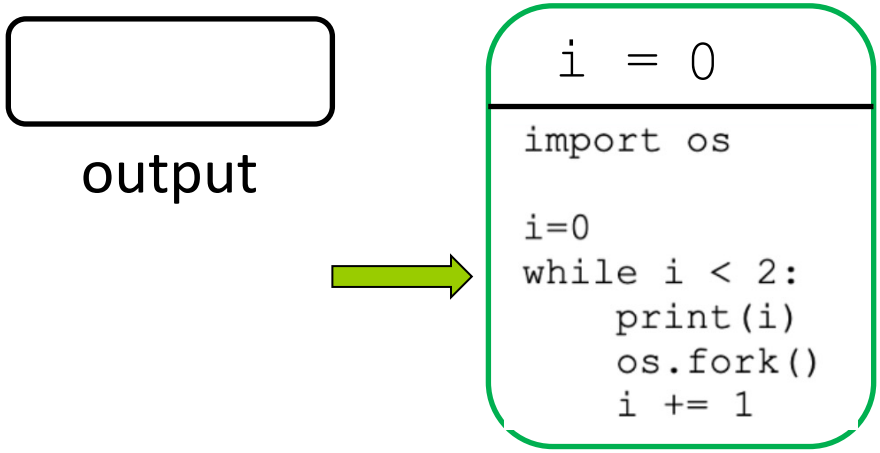
sajavadi@aut.ac.ir

Spring 2022

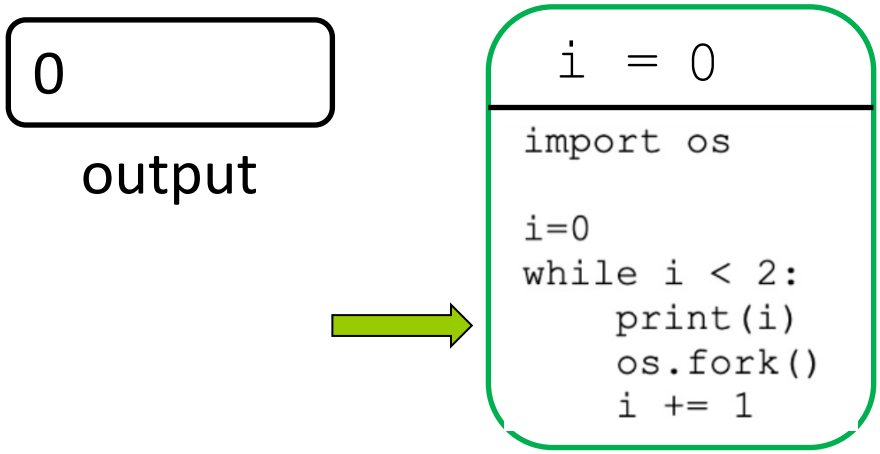
Fork Example



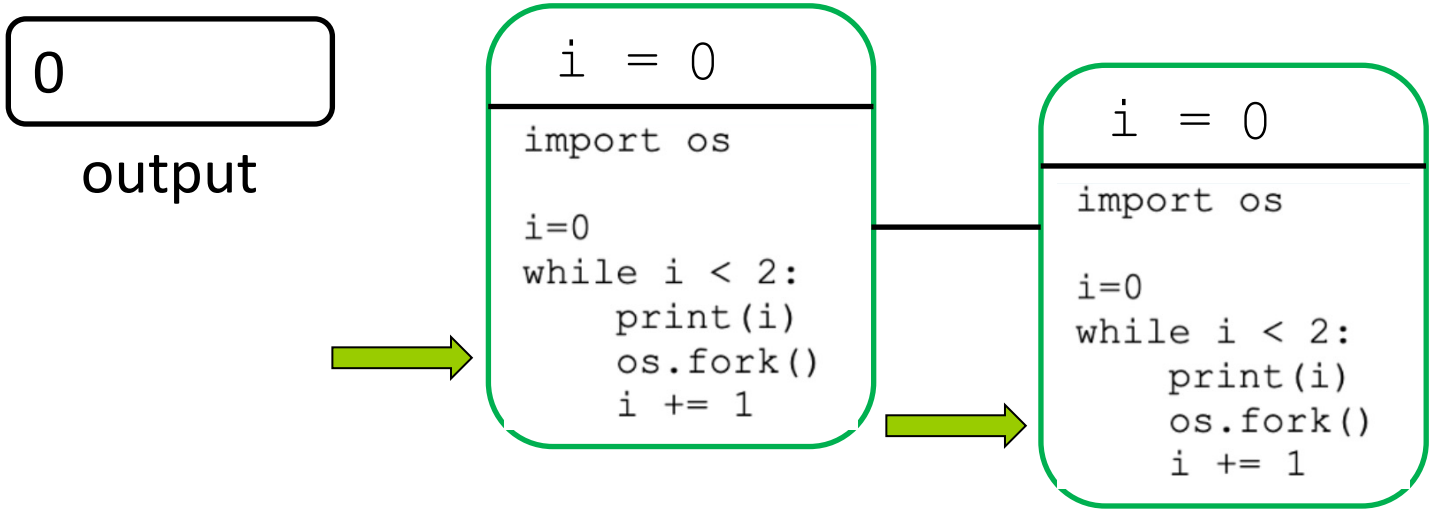
Fork Example



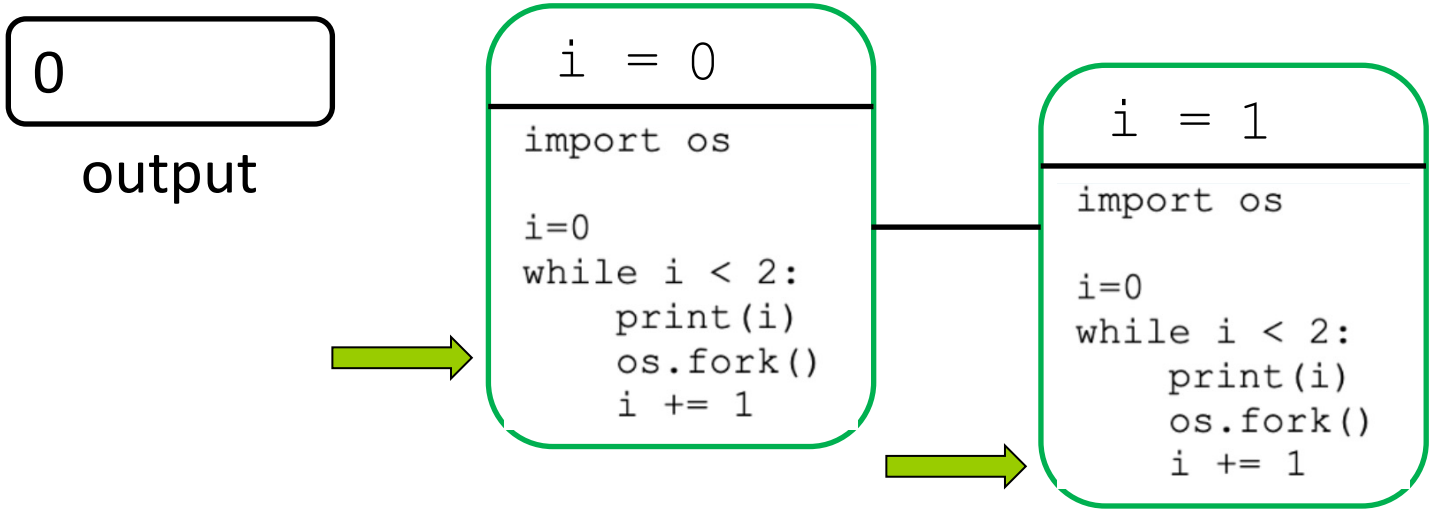
Fork Example



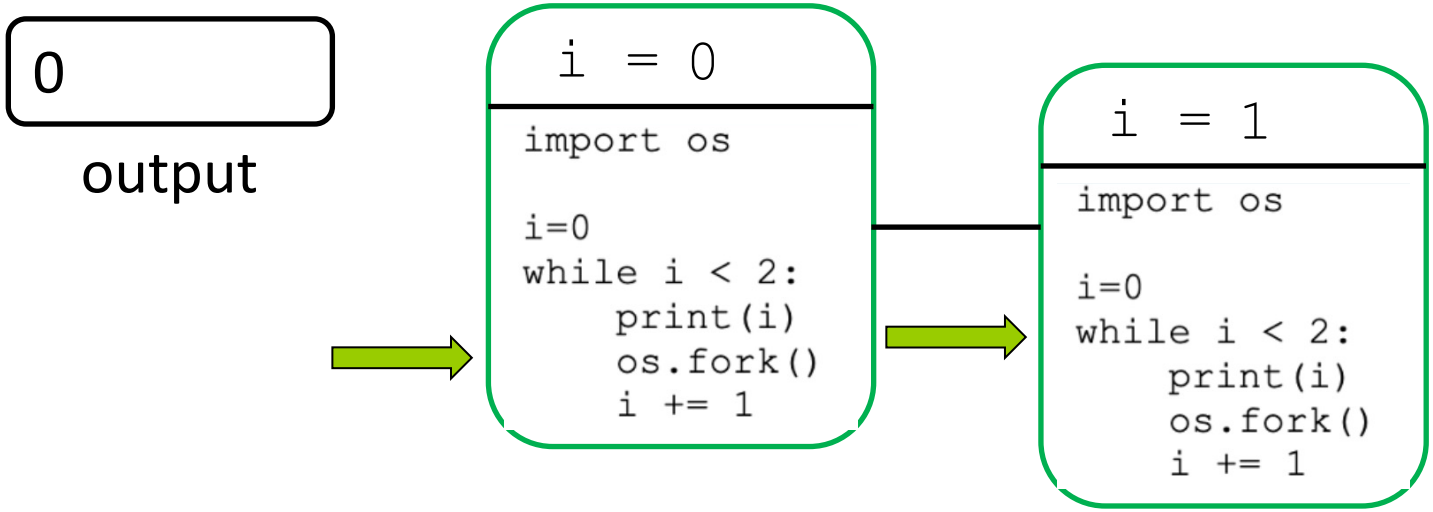
Fork Example



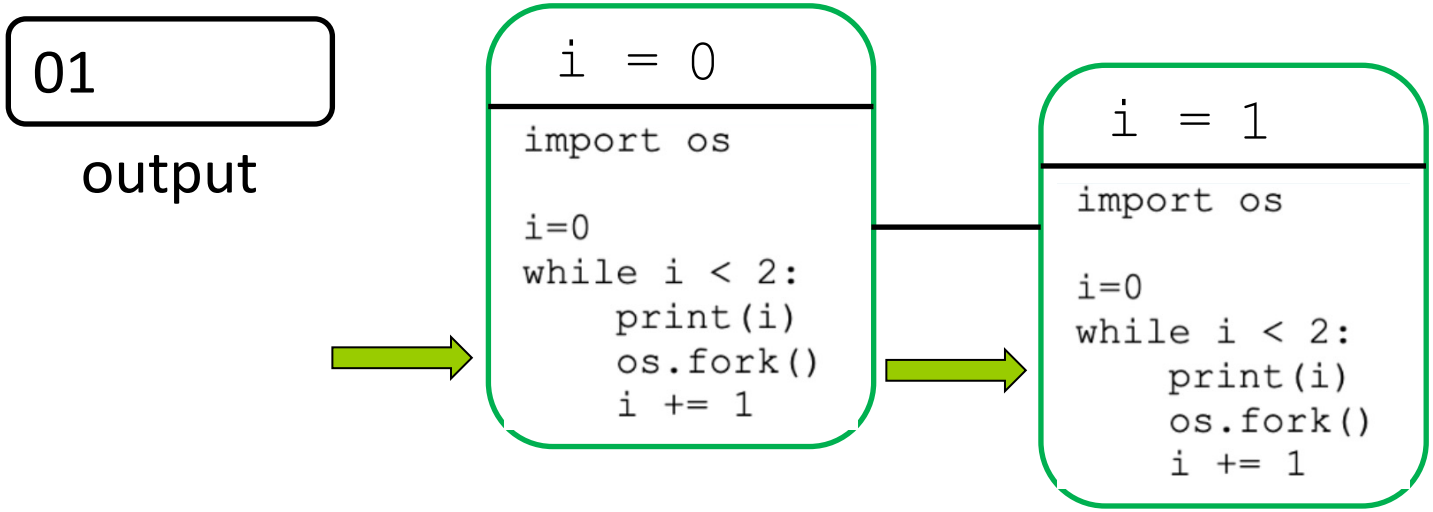
Fork Example



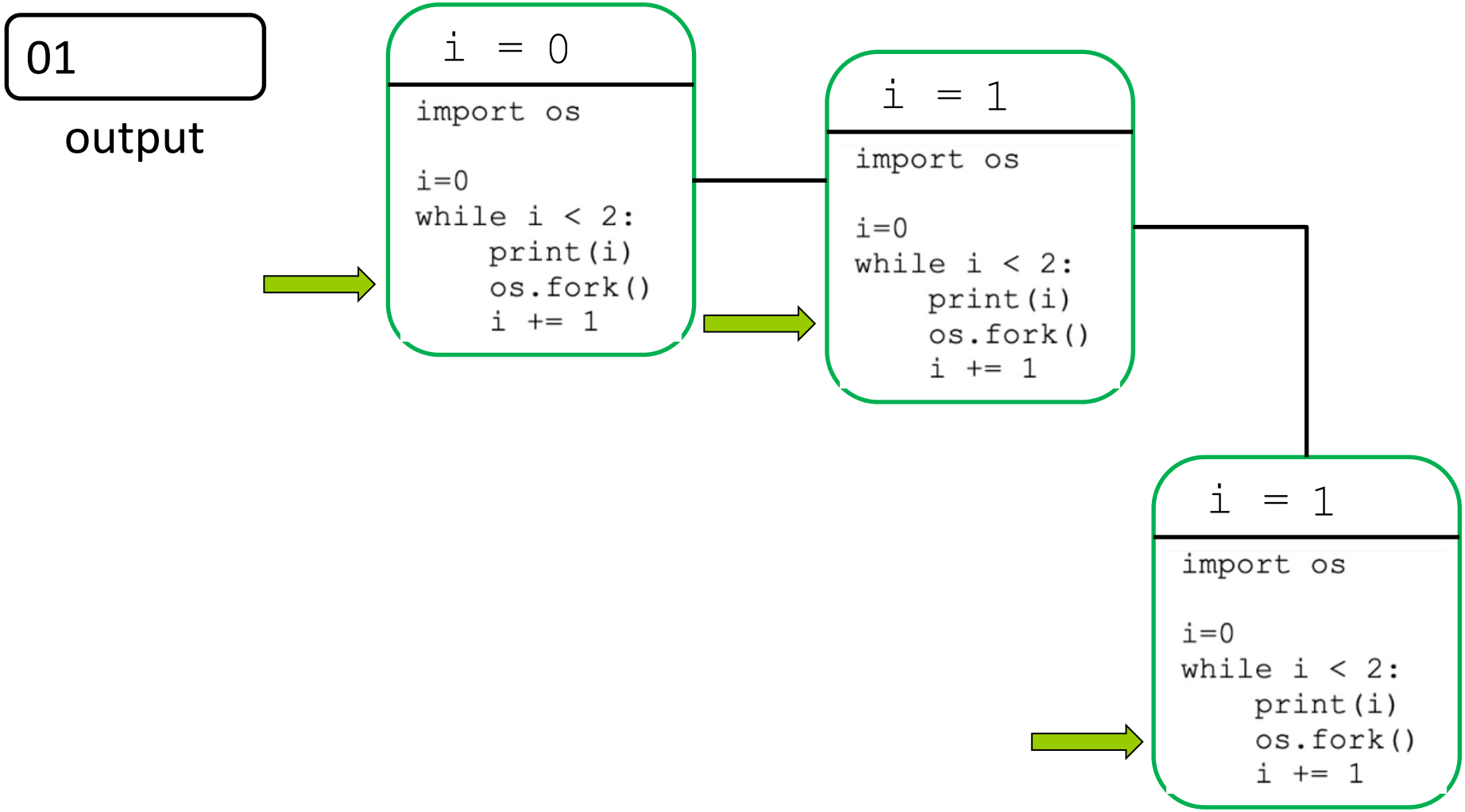
Fork Example



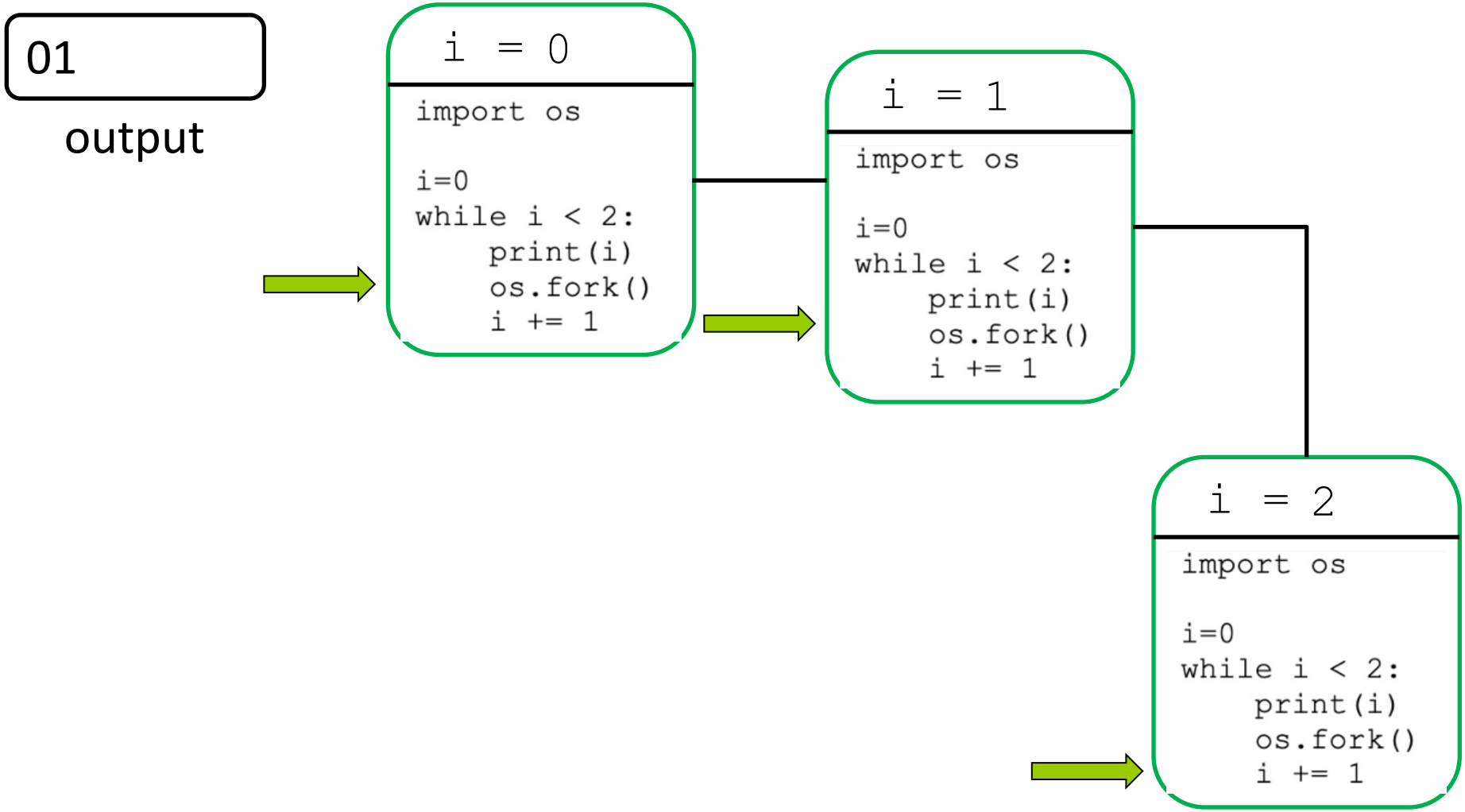
Fork Example



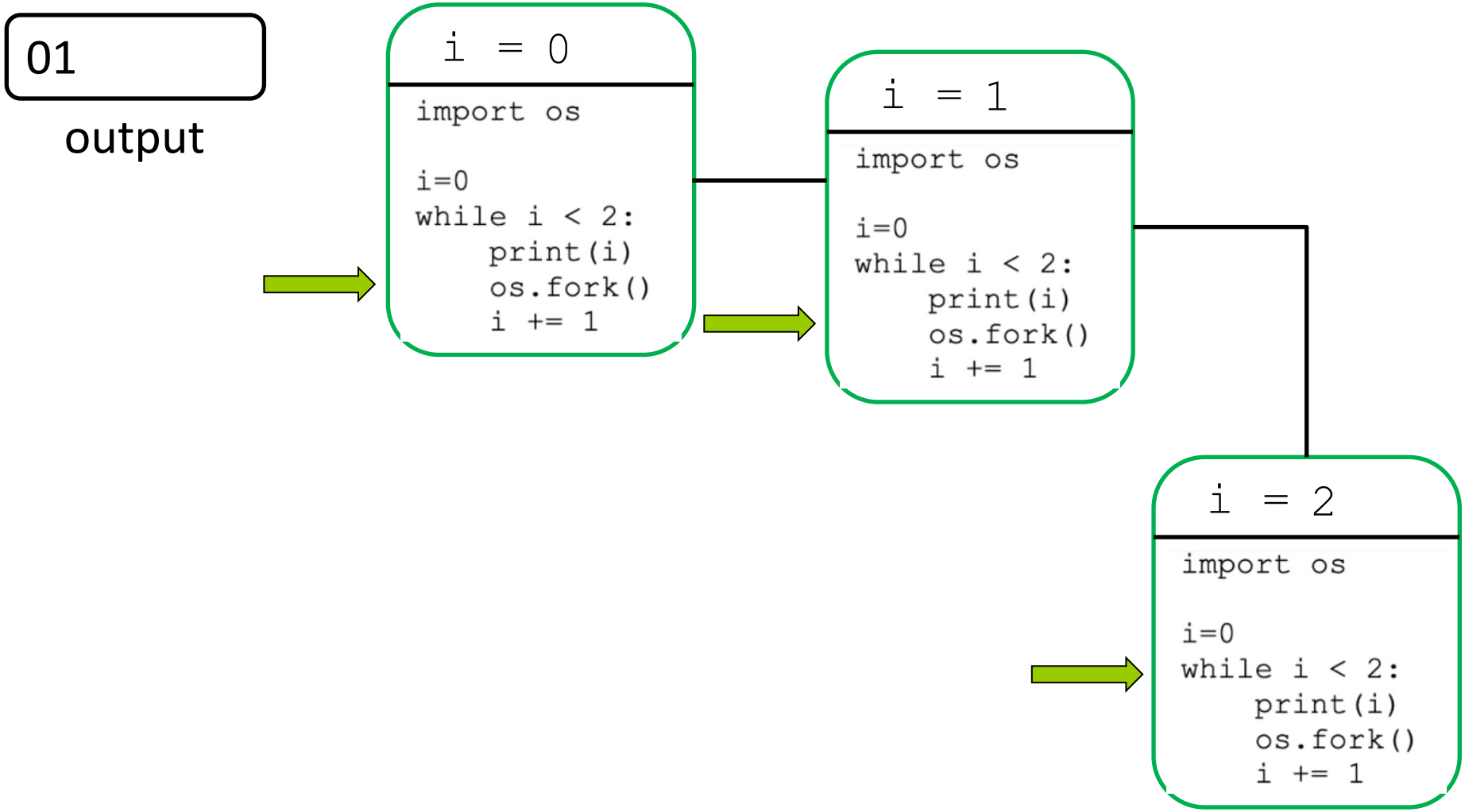
Fork Example



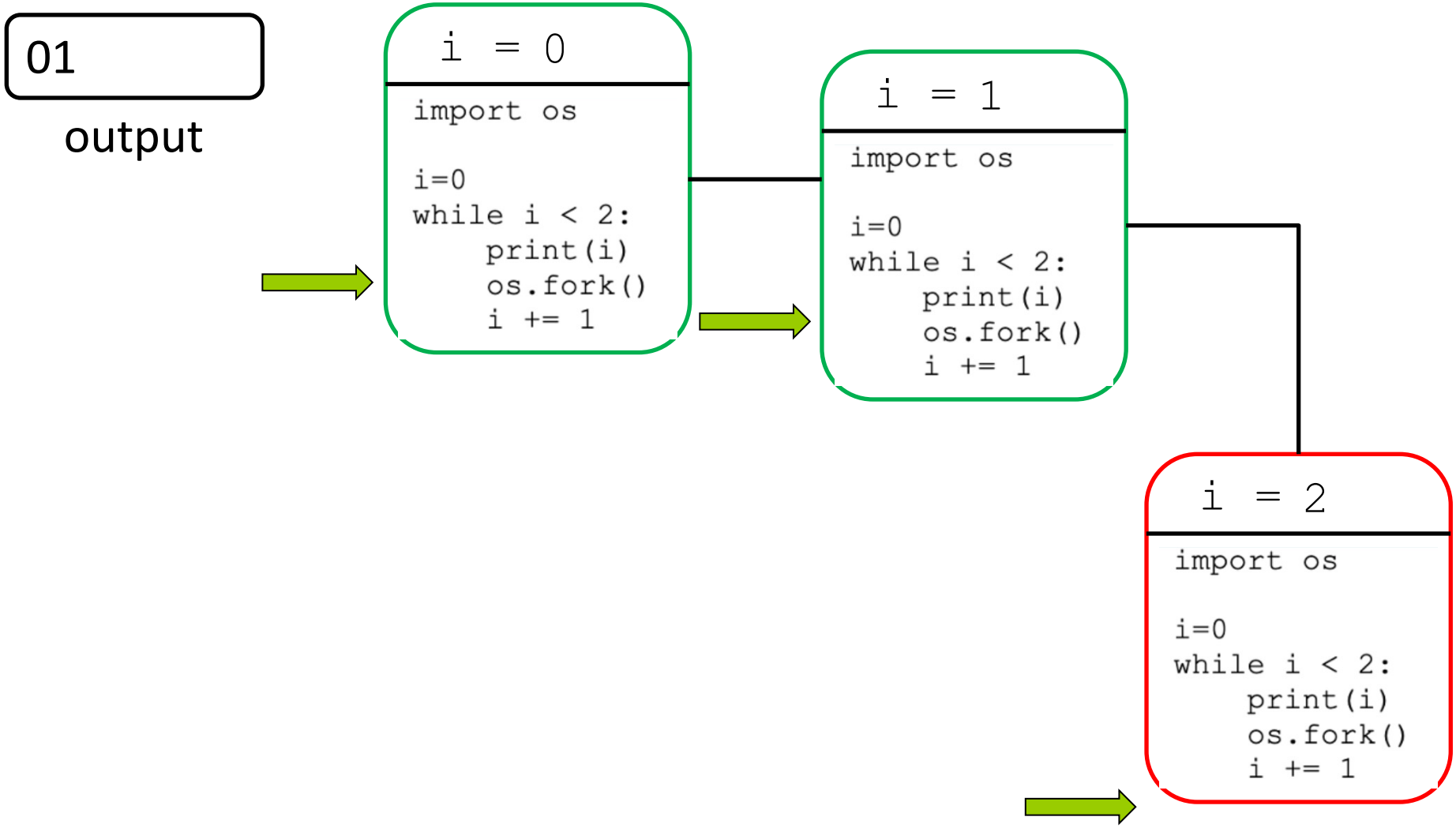
Fork Example



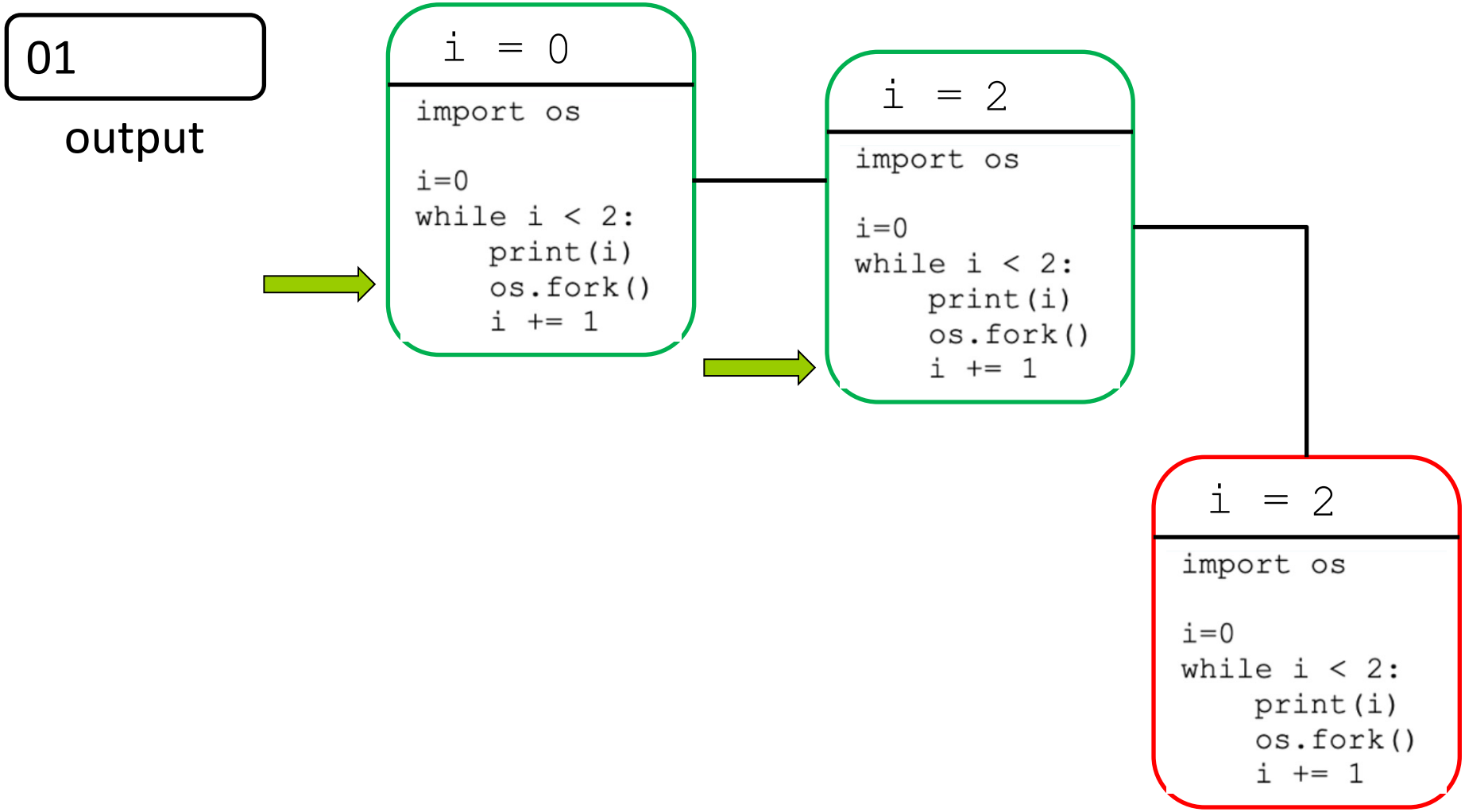
Fork Example



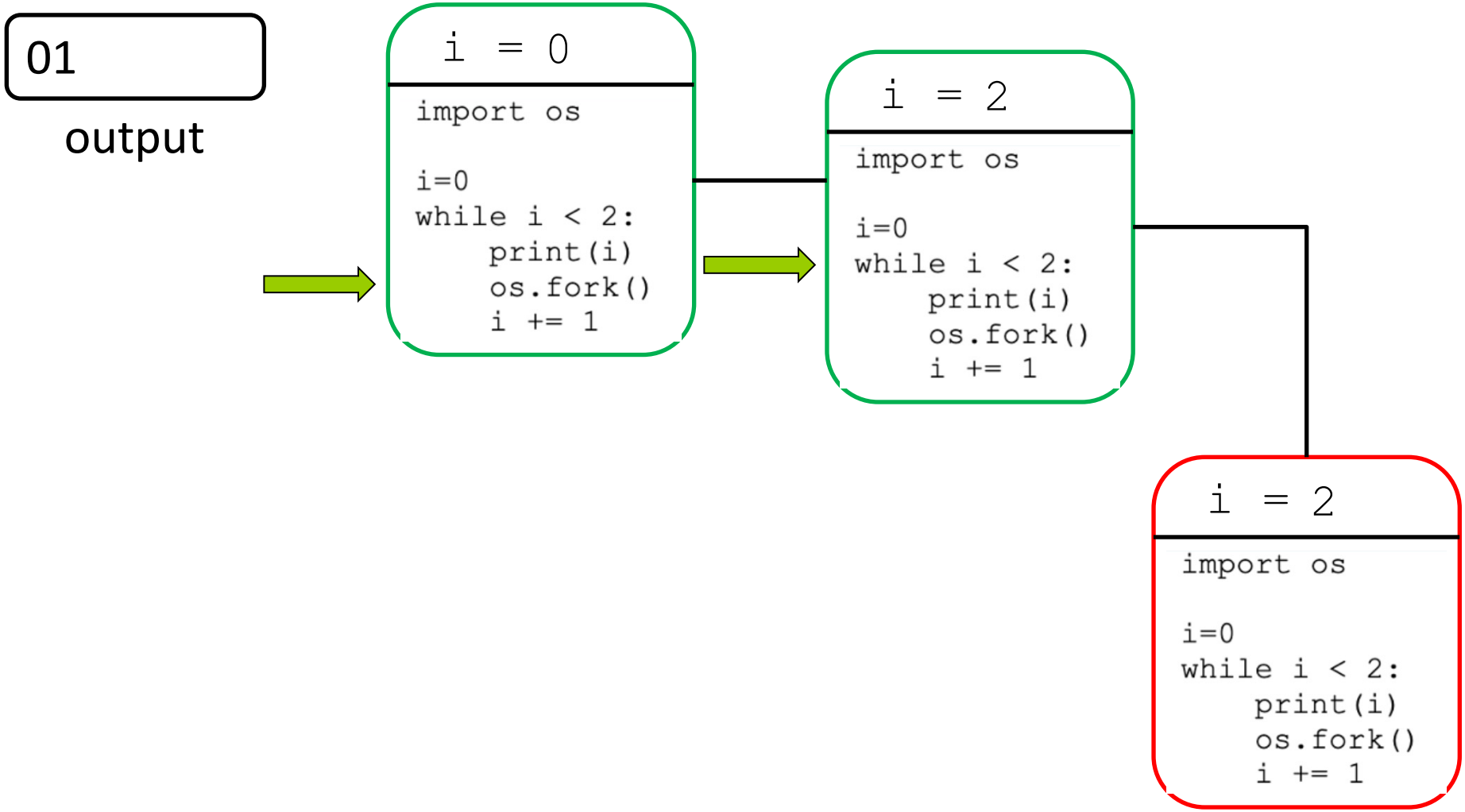
Fork Example



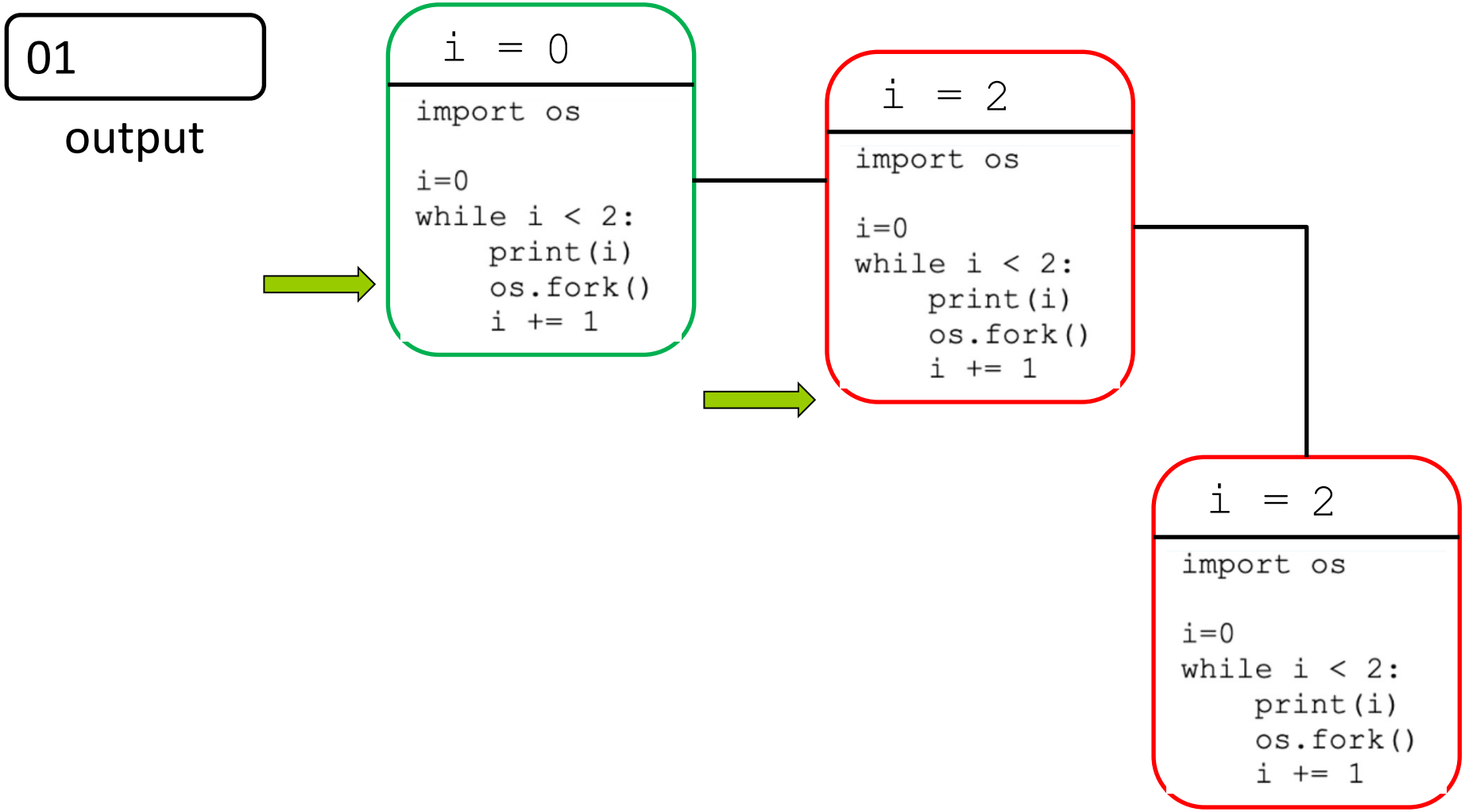
Fork Example



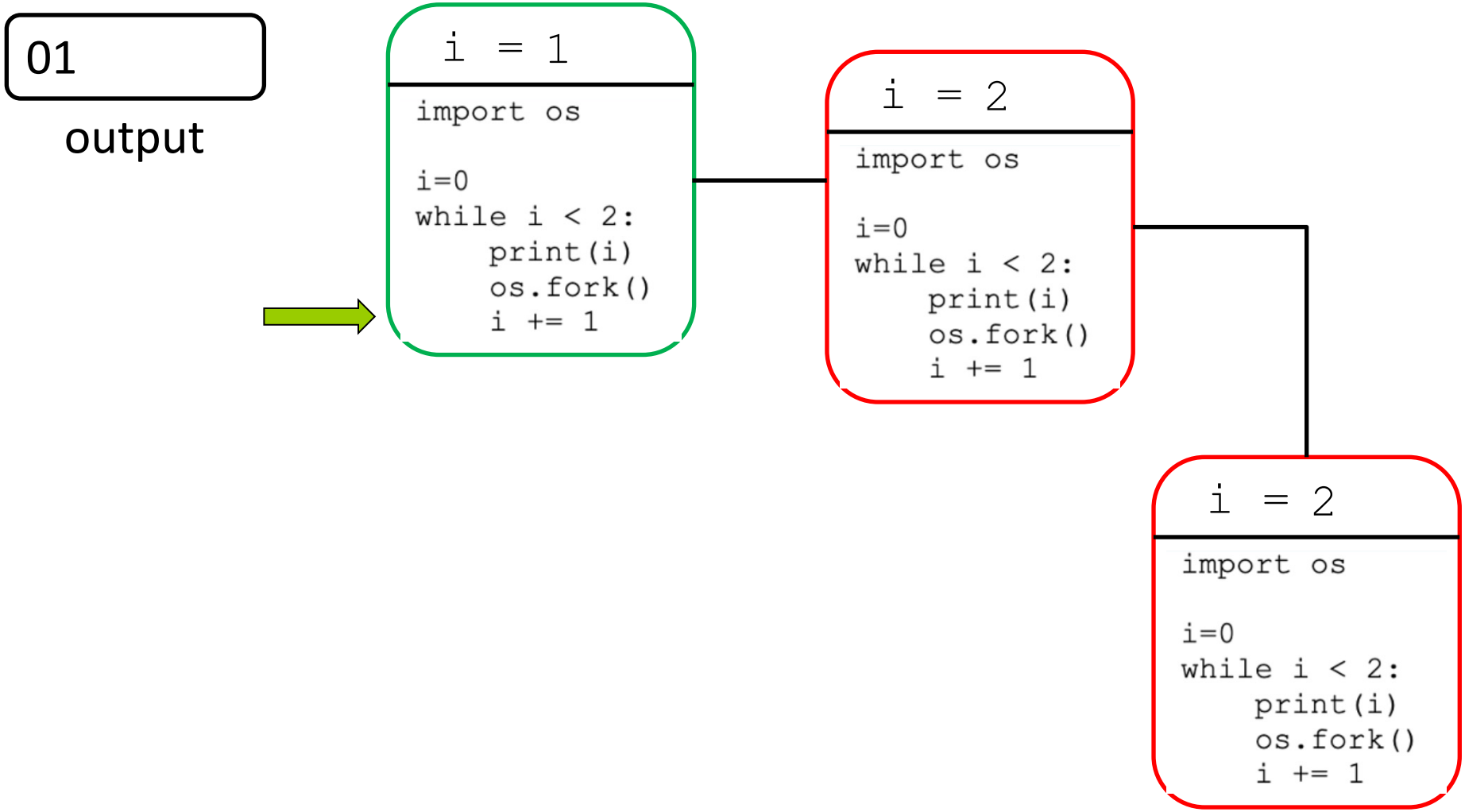
Fork Example



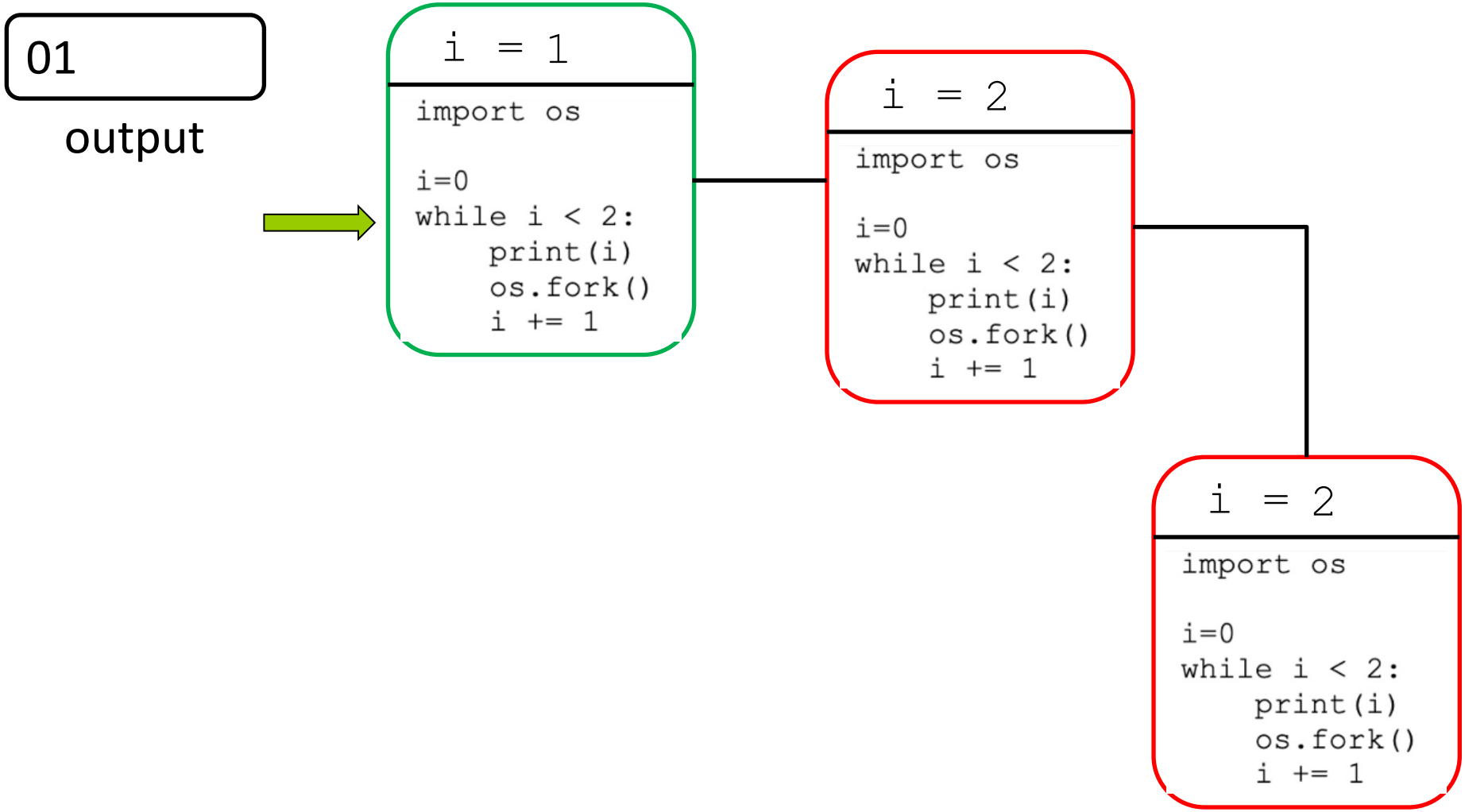
Fork Example



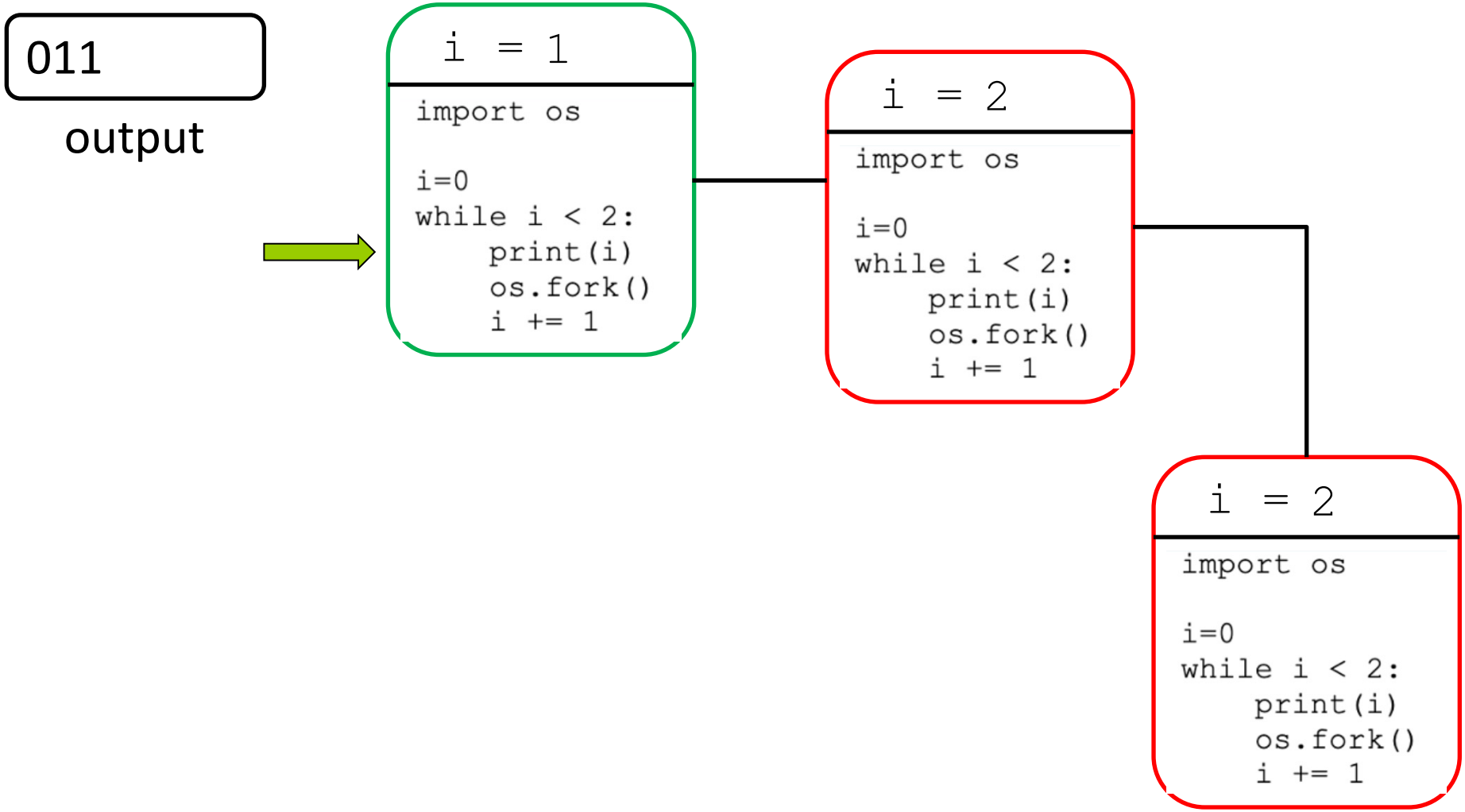
Fork Example



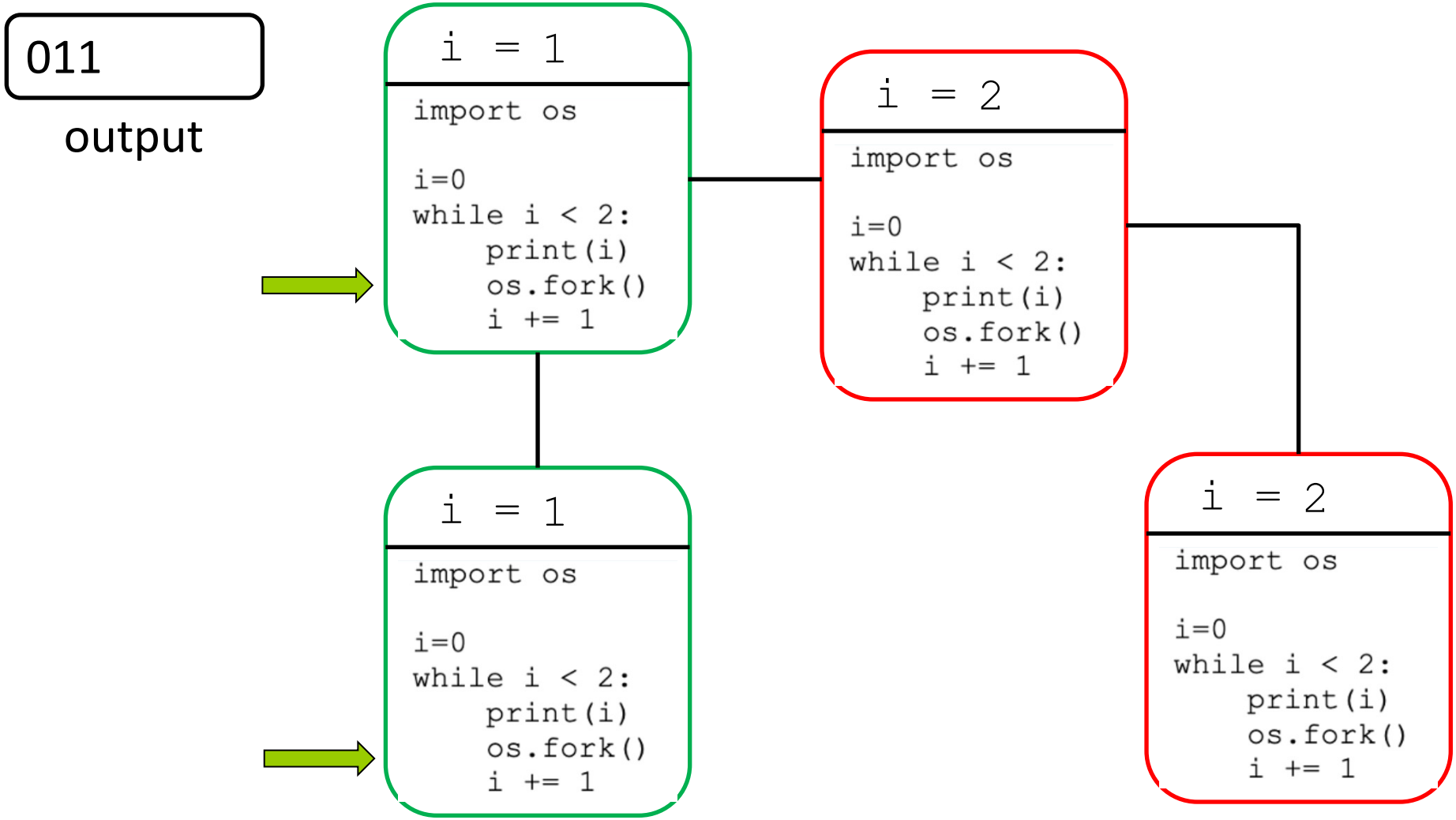
Fork Example



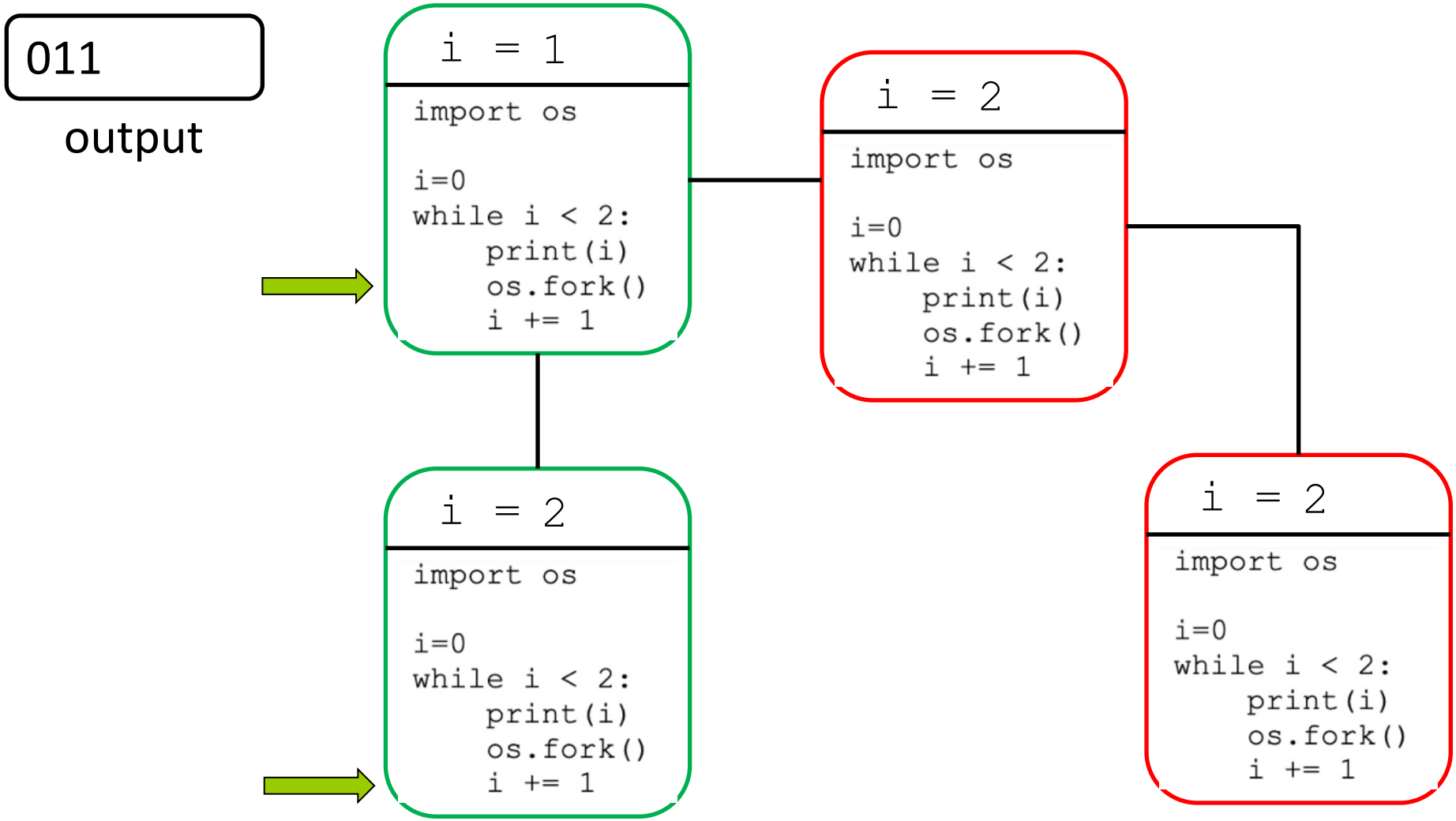
Fork Example



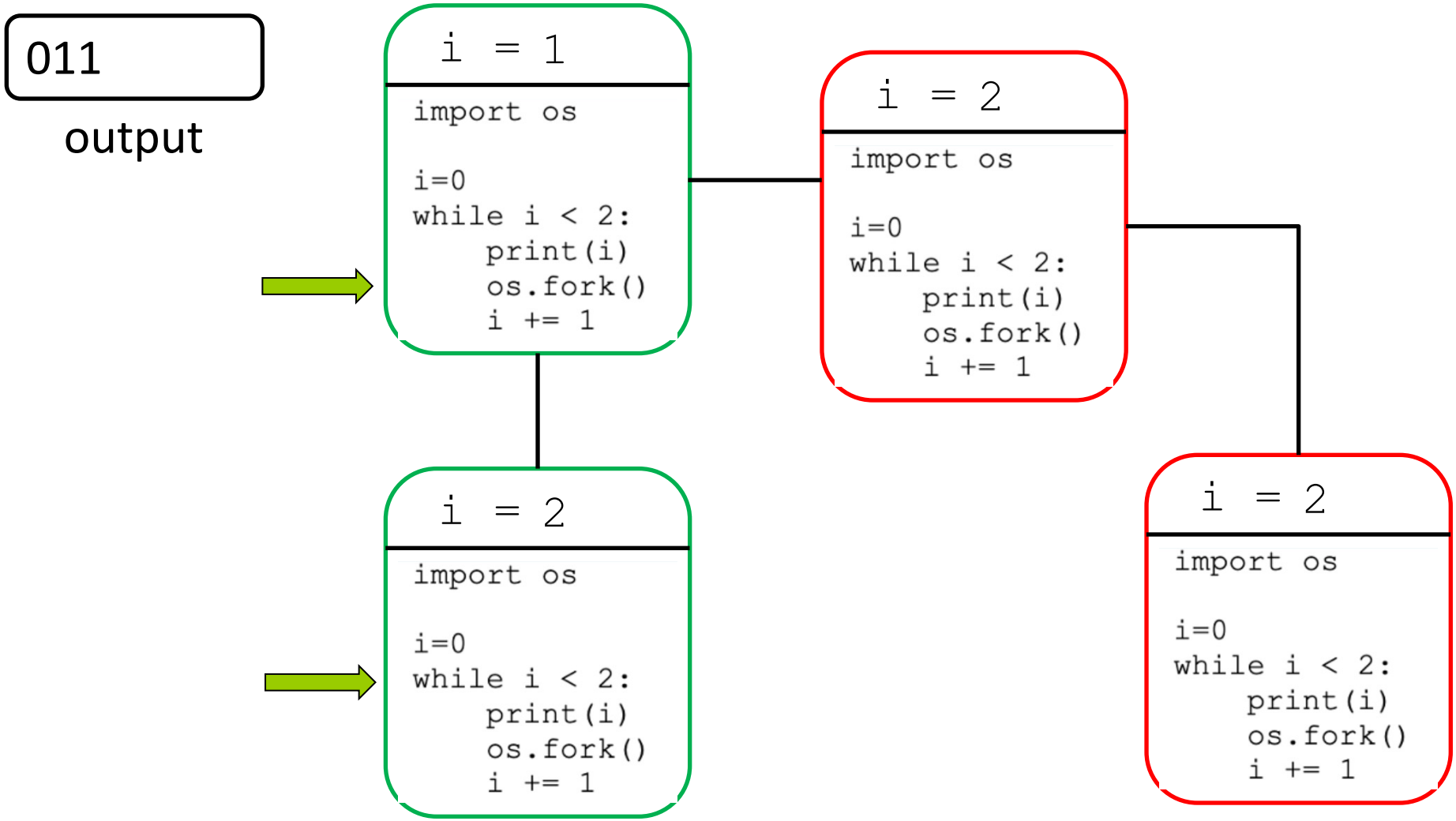
Fork Example



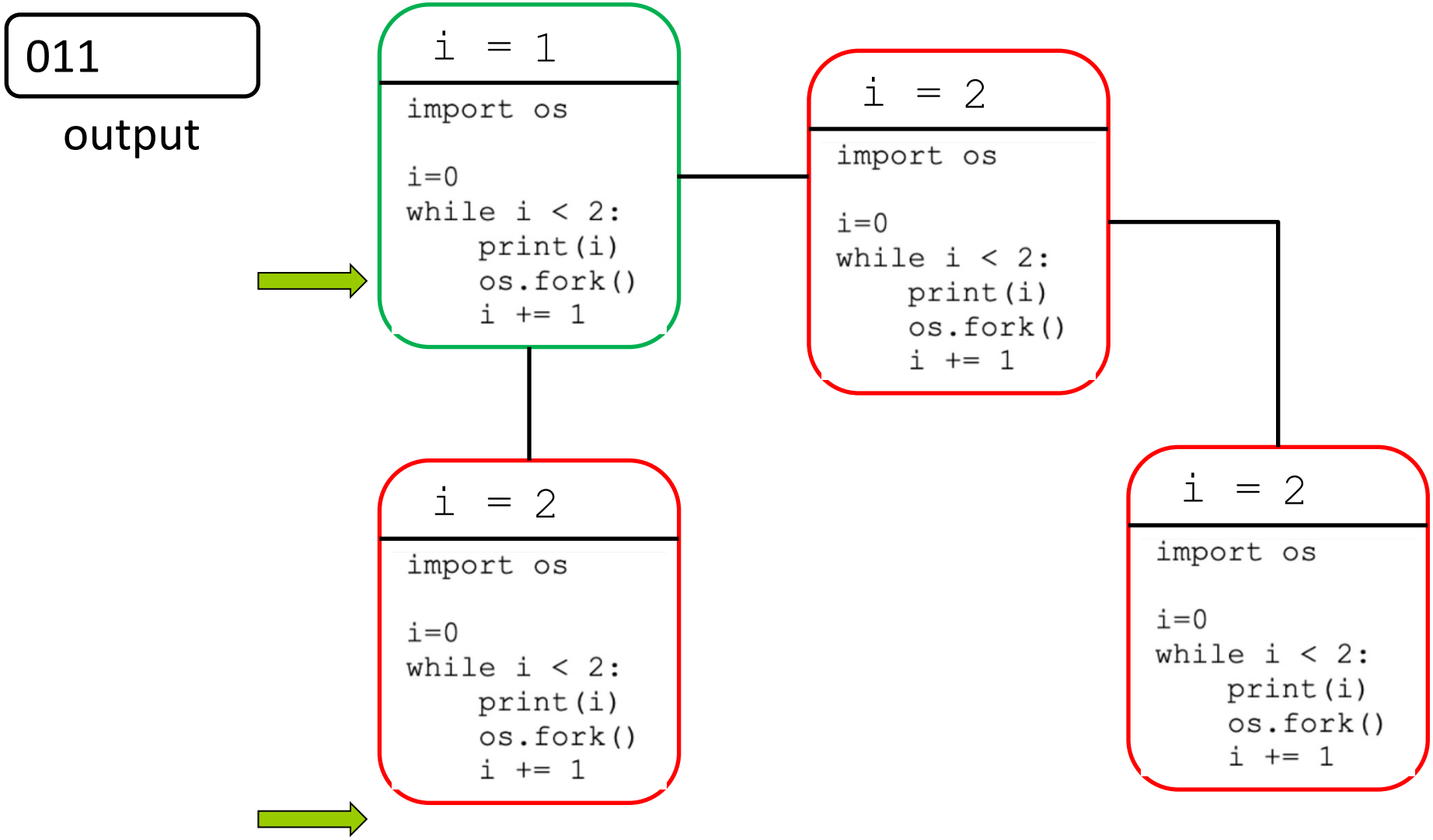
Fork Example



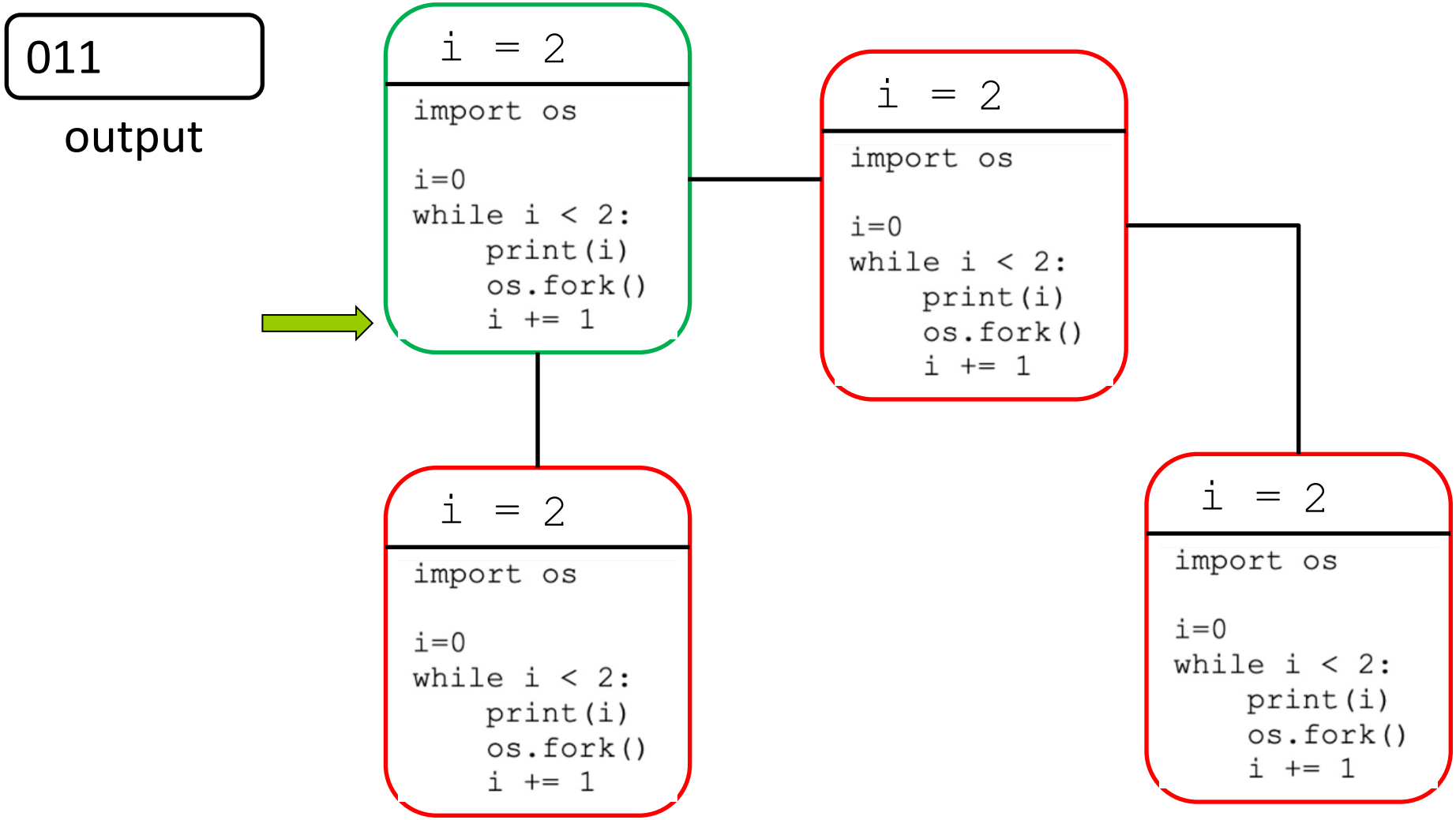
Fork Example



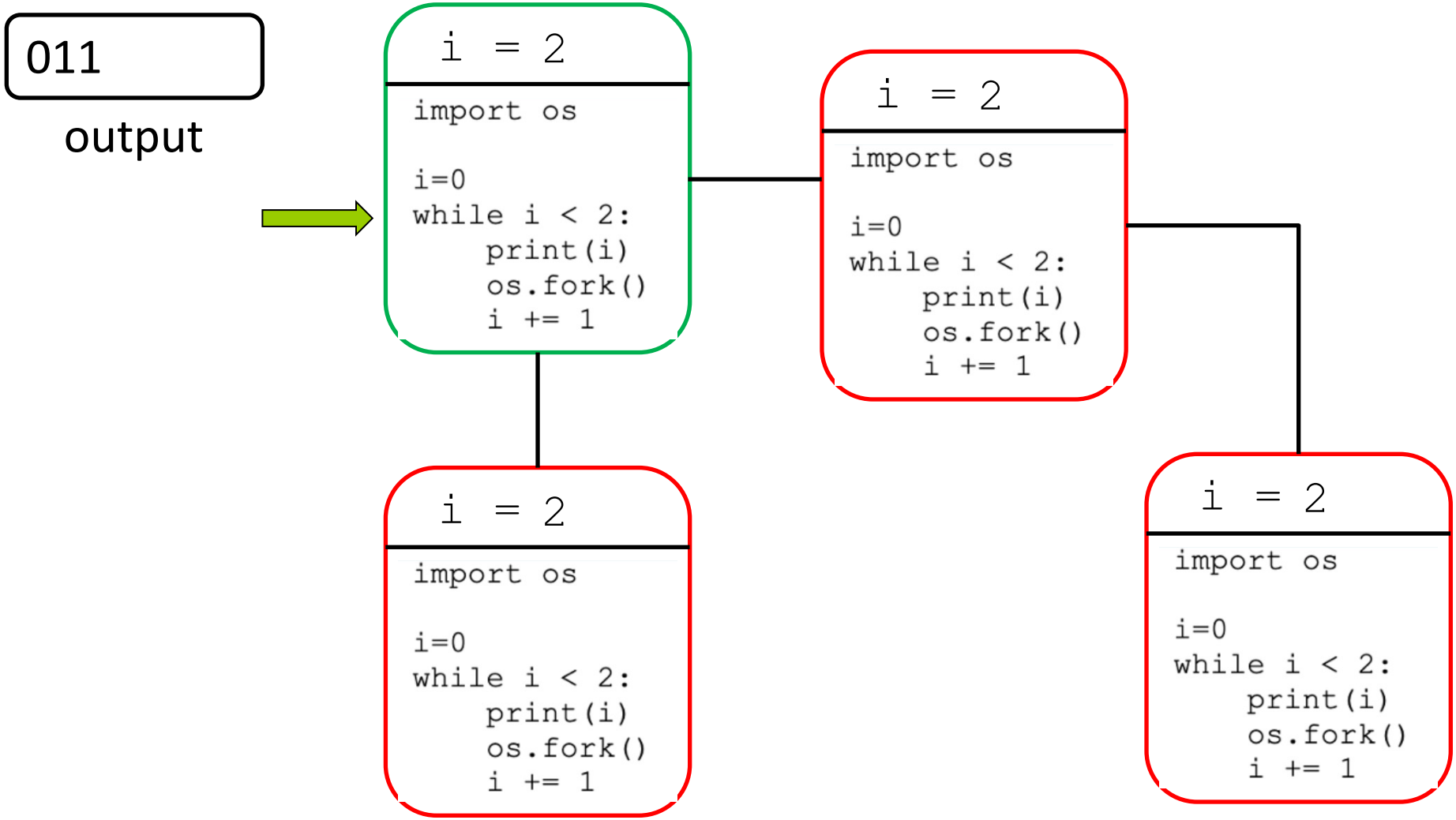
Fork Example



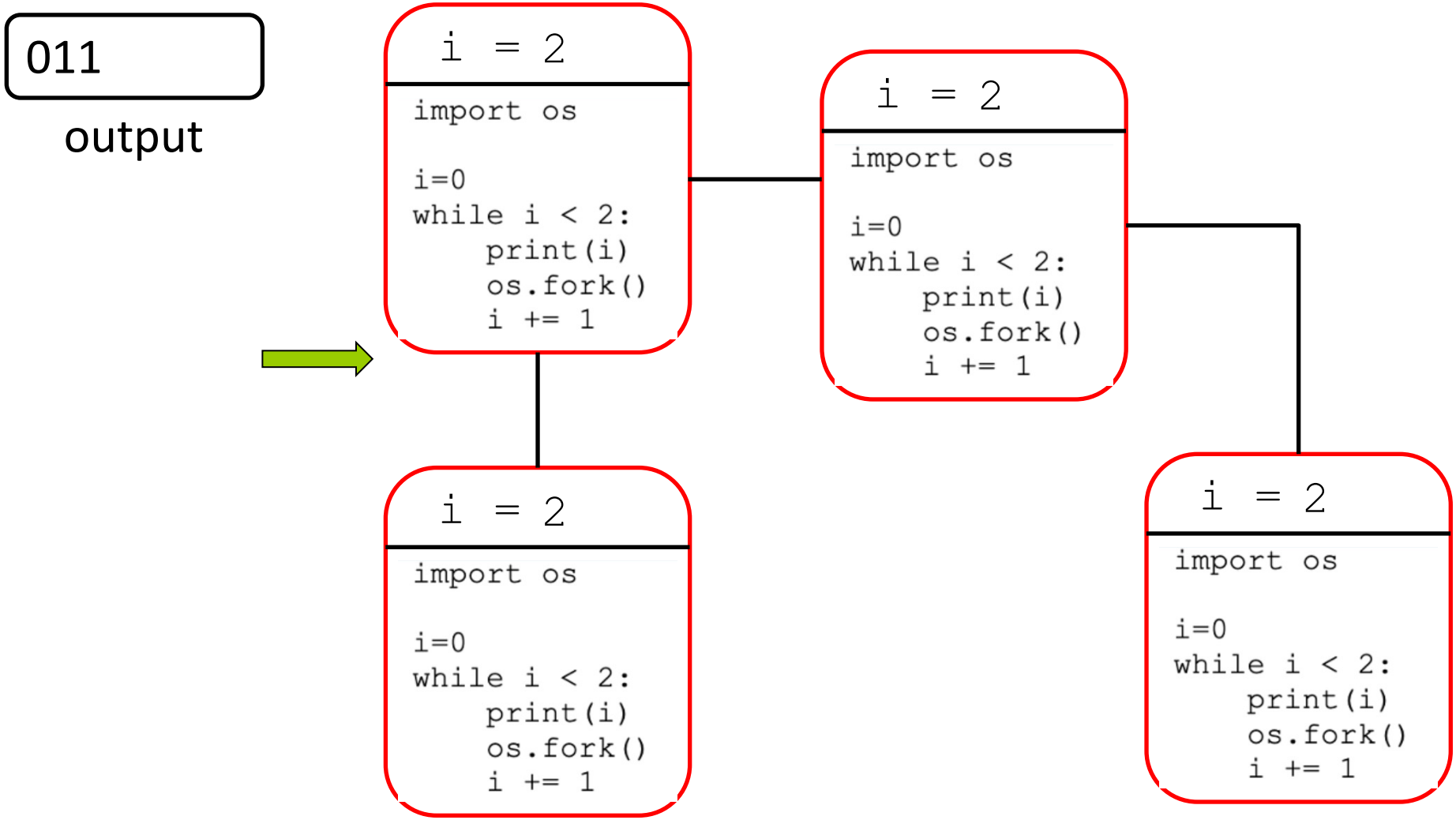
Fork Example



Fork Example

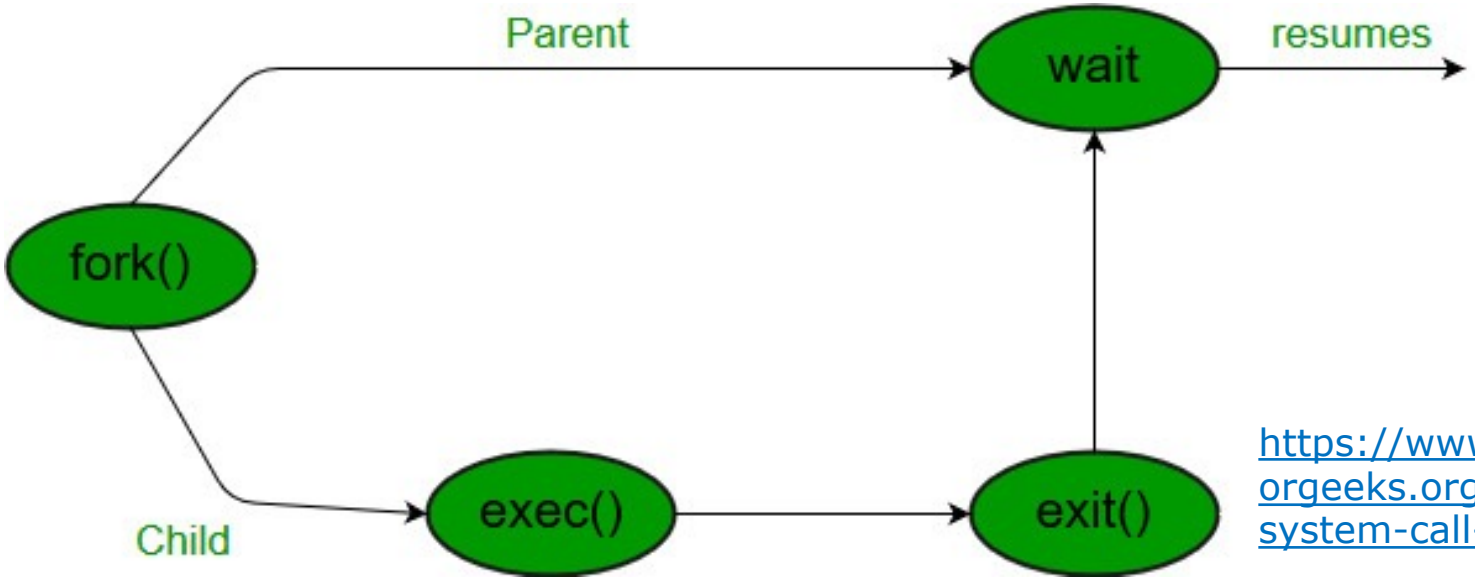


Fork Example



Process Termination

- Process executes last statement and then asks the operating system to ***delete it*** using the **`exit()`** system call.
  - Returns status data from child to parent (via **`wait()`**)
  - Process' resources are deallocated by operating system.



https://www.geeksforgeeks.org/wait-system-call-c/

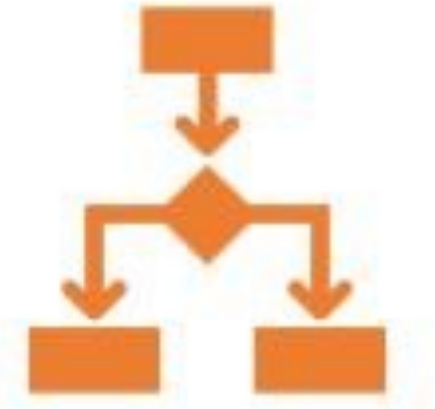
Process Termination (cont.)

- Parent may terminate the execution of children processes using the **`abort()`** system call.

- Some reasons for doing so:
  - Child has exceeded allocated resources.
  - Task assigned to child is no longer required.
  - The parent is exiting, and the operating systems does not allow a child to continue if its parent terminates.

Process Termination (cont.)

- Some OSs do not allow child to ***exists*** if its parent has terminated.
  - If a process terminates, then all its children must also be terminated.
  - **Cascading termination:** All children, grandchildren, etc., are terminated.
  - The termination is initiated by the operating system.



Process Termination (cont.)

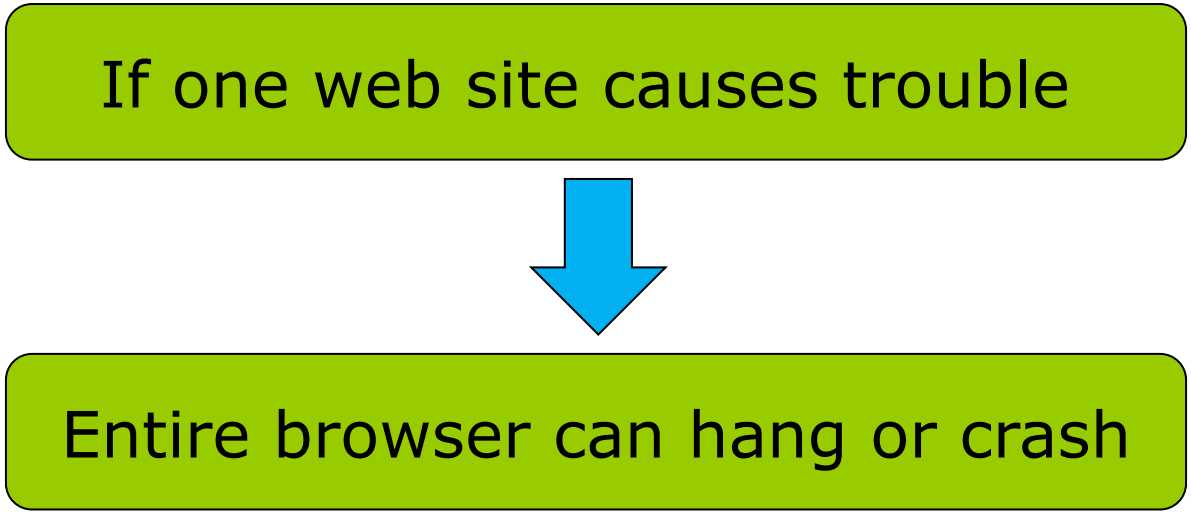
- The parent process may wait for termination of a child process by using the ***wait()*** system call.
  - The call returns status information and the pid of the terminated process.

pid = wait(&status);

- If no parent waiting (did not invoke wait()), process is a zombie.
- If parent terminated without invoking wait(), process is an orphan.

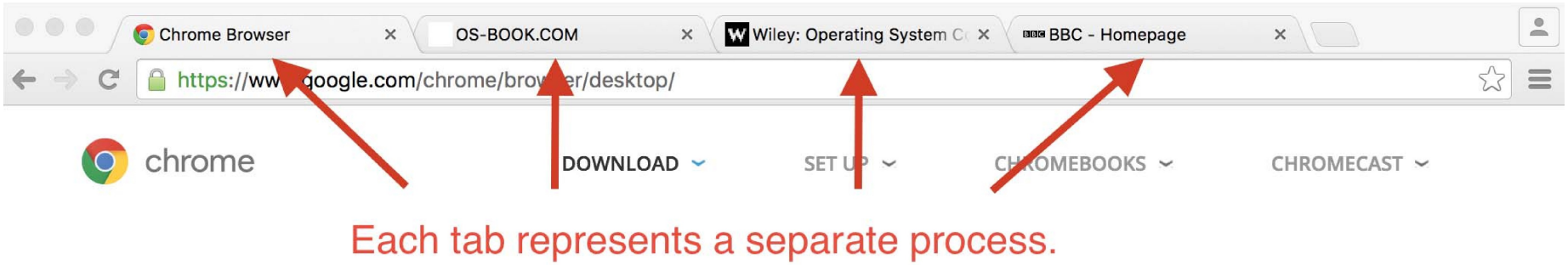
Multiprocess Architecture – Browser

- Many web browsers ran as single process (some still do)



Multiprocess Architecture – Chrome Browser (cont.)

- Google Chrome is multiprocess with 3 different types of processes:
  - Browser process manages user interface, disk and network I/O.
  - Renderer process renders web pages, deals with HTML, Javascript.
    - A new renderer created for each website opened
    - Runs in sandbox restricting disk and network I/O (why?)
  - Plug-in process for each type of plug-in.



Inter-Process Communication

- Processes within a system may be ***independent*** or ***cooperating***
- Cooperating process can affect or be affected by other processes, including ***sharing data***.
- Reasons for cooperating processes:
  - Information sharing
  - Computation speedup
  - Modularity
  - Convenience

Inter-Process Communication (Cont.)

- Cooperating processes need interprocess communication (IPC)

- Two models of IPC
  - **Shared memory**
  - **Message passing**
    - **We do not cover this.**

Communications Models