Operating Systems

Lecture 2: The Process

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Aug 3, 2018

OS Design Goals

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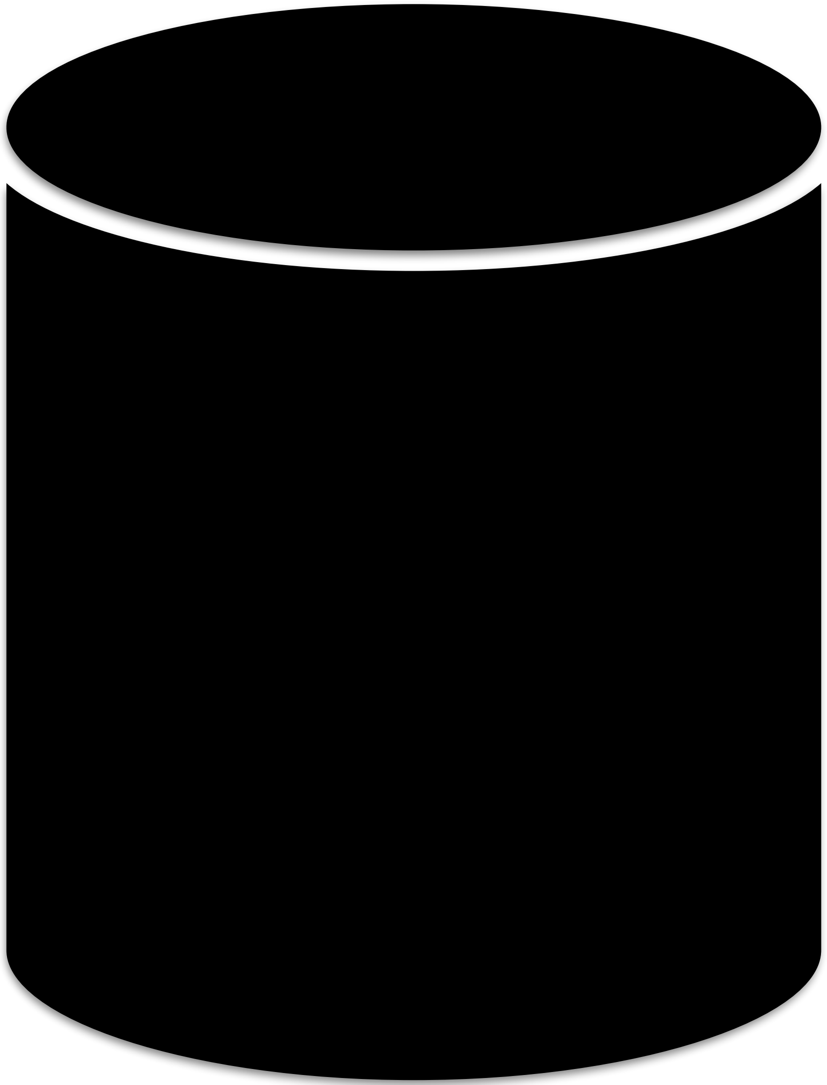
4. Energy efficiency (esp. for mobile systems!)

Process

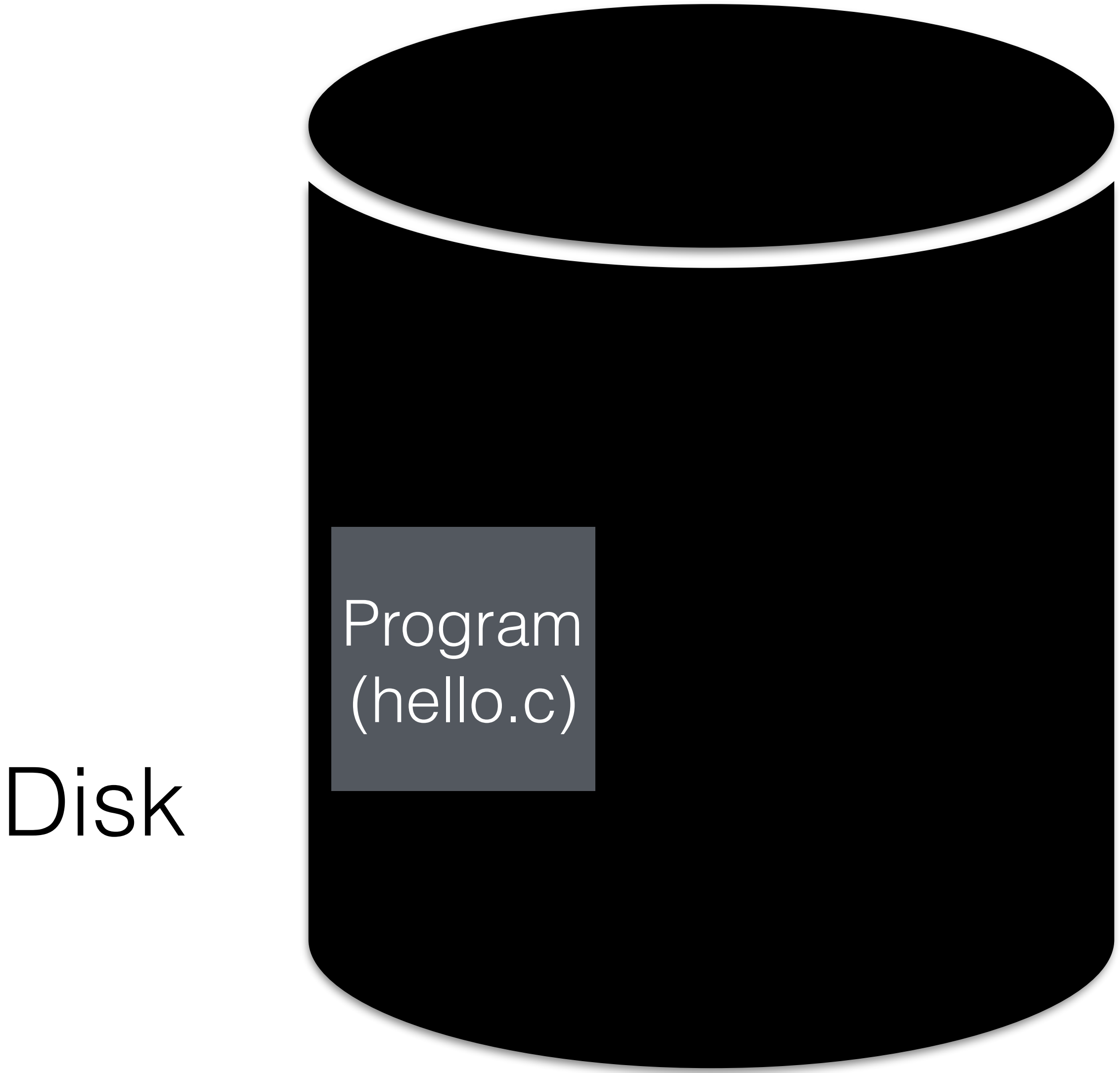
- Process = Running program
- Review example from previous lecture
  - Output of top
  - Activity monitor

Process Execution



Disk

Process Execution



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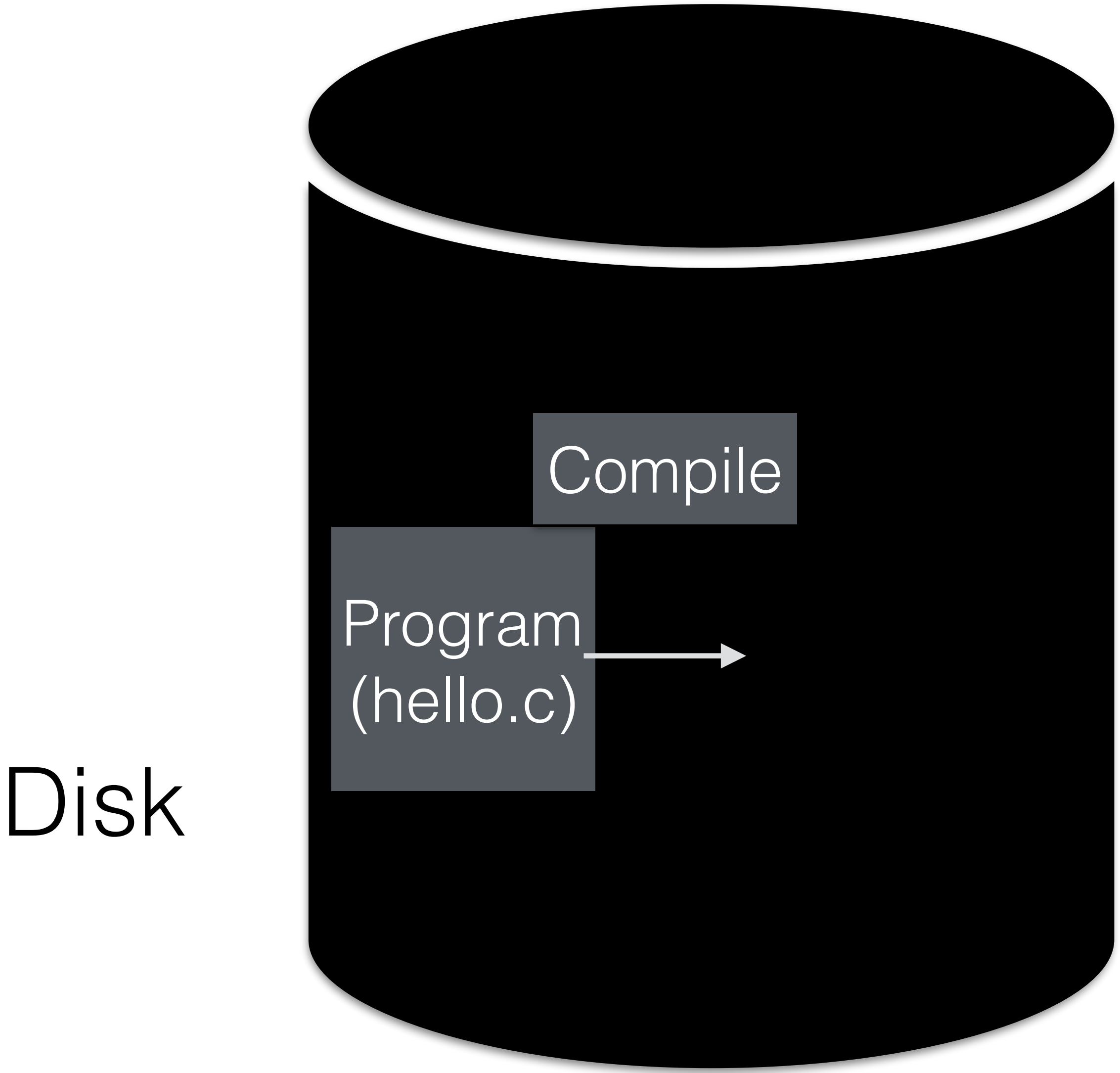
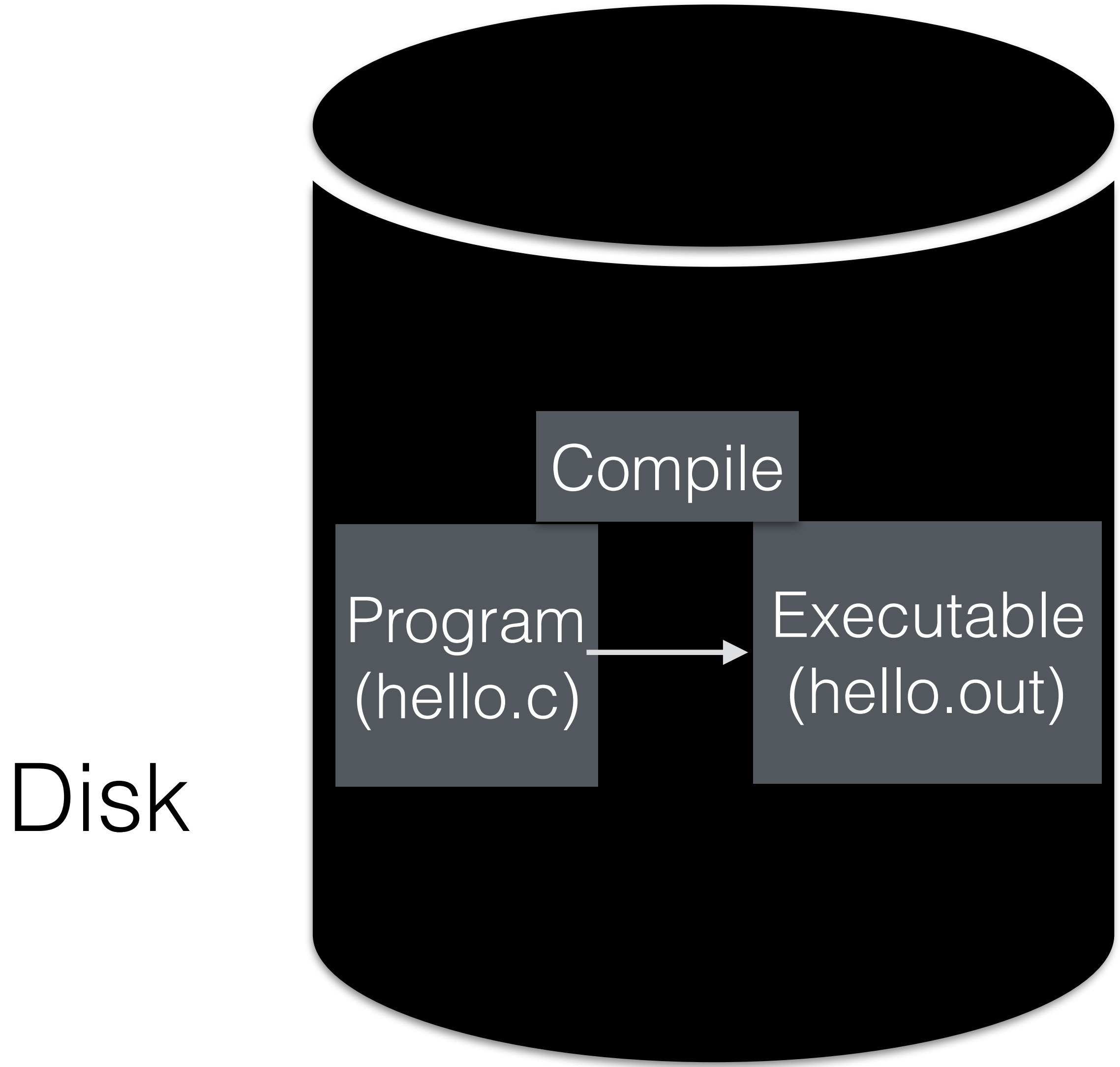


Disk

Compile

Program
(hello.c)

Process Execution



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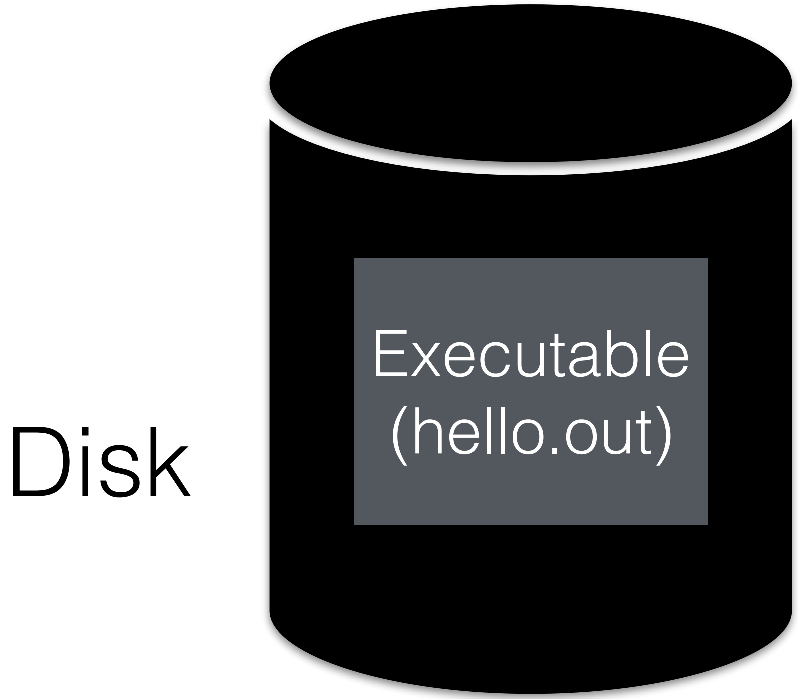
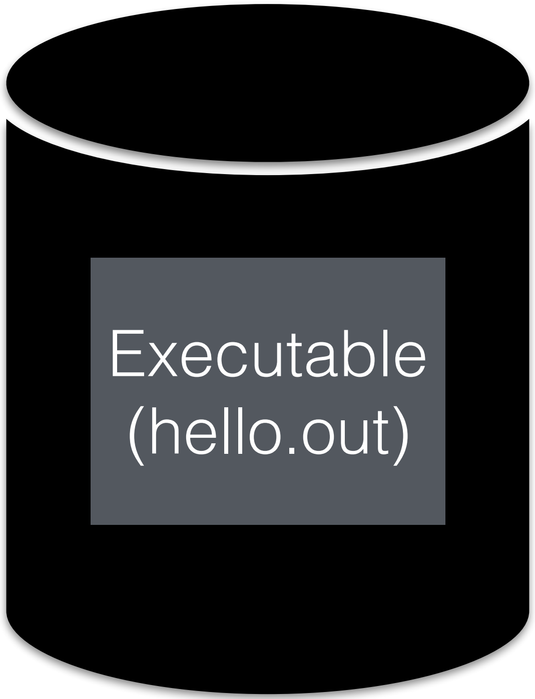


Process Execution

Disk



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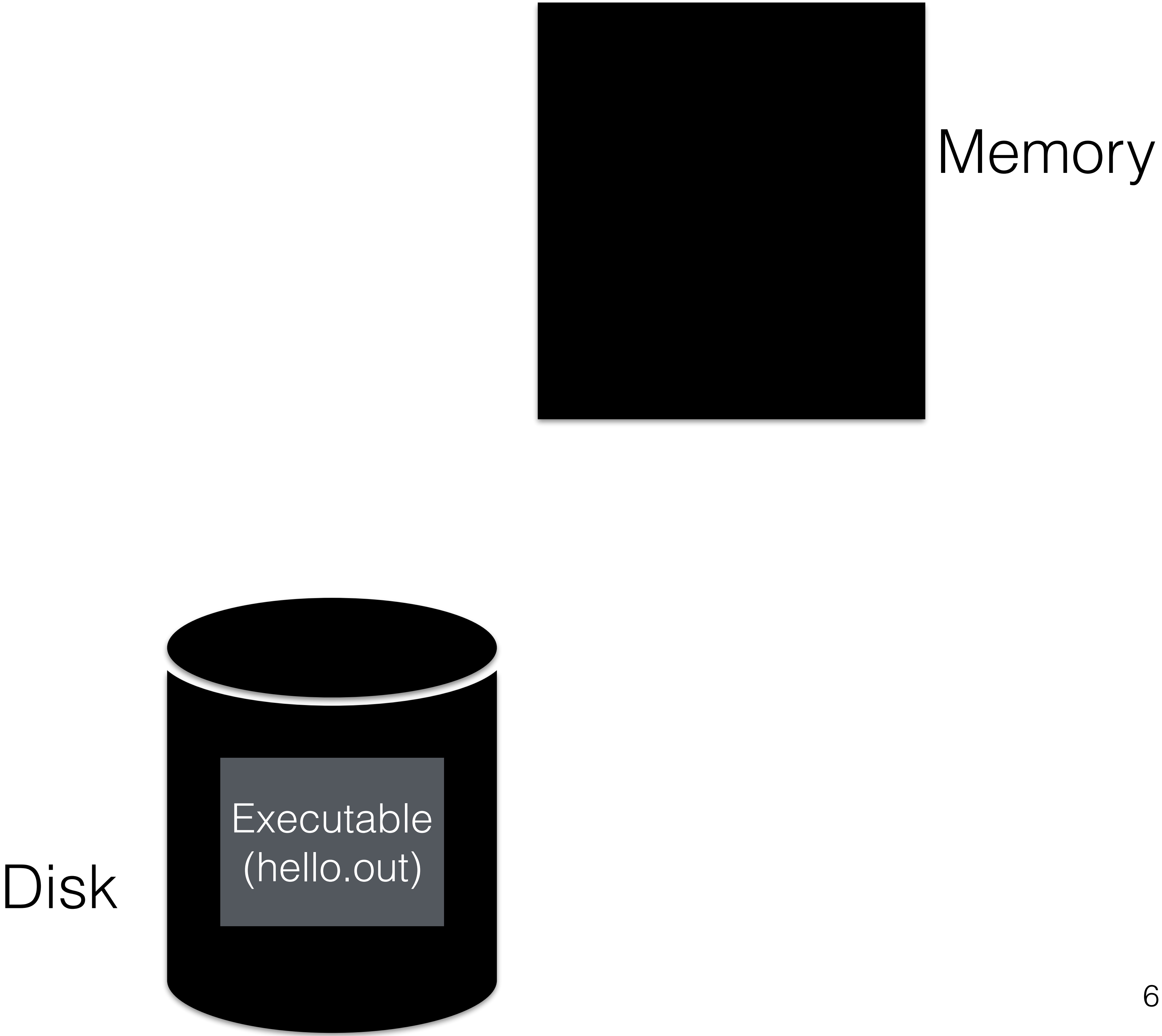
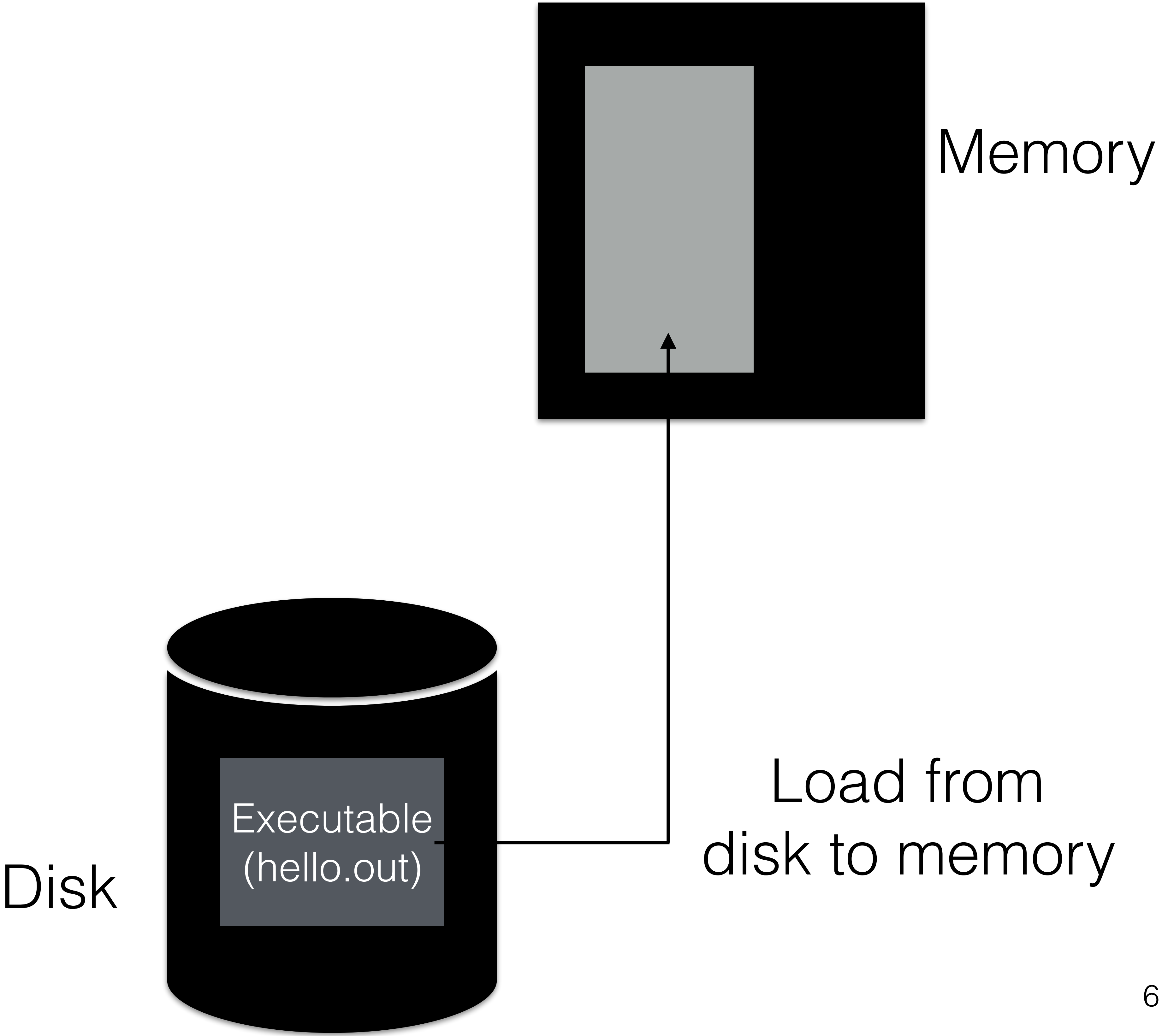


Memory

Disk

Executable (hello.out)

Process Execution



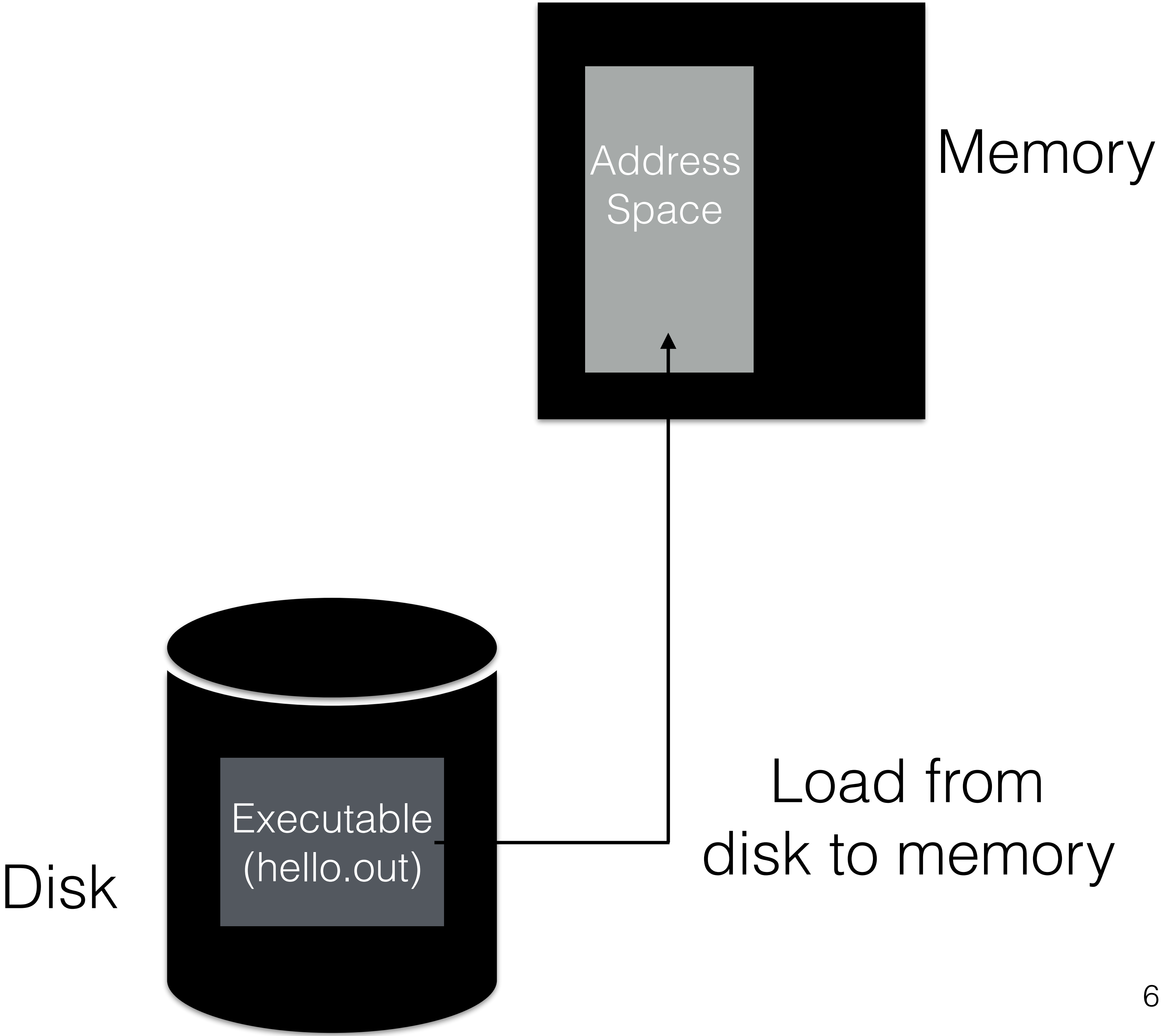
Memory

Executable (hello.out)

Disk

Load from disk to memory

Process Execution



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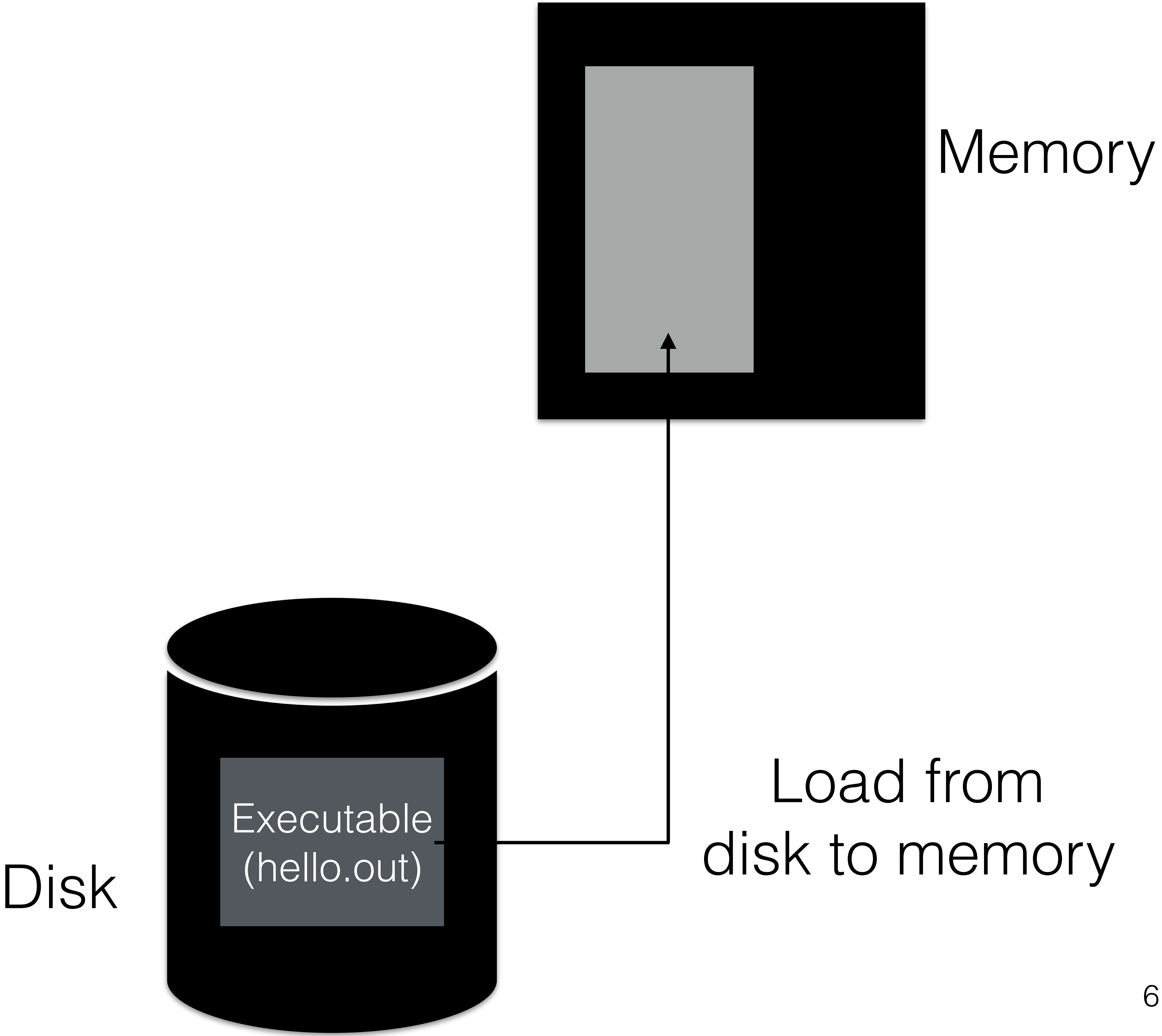

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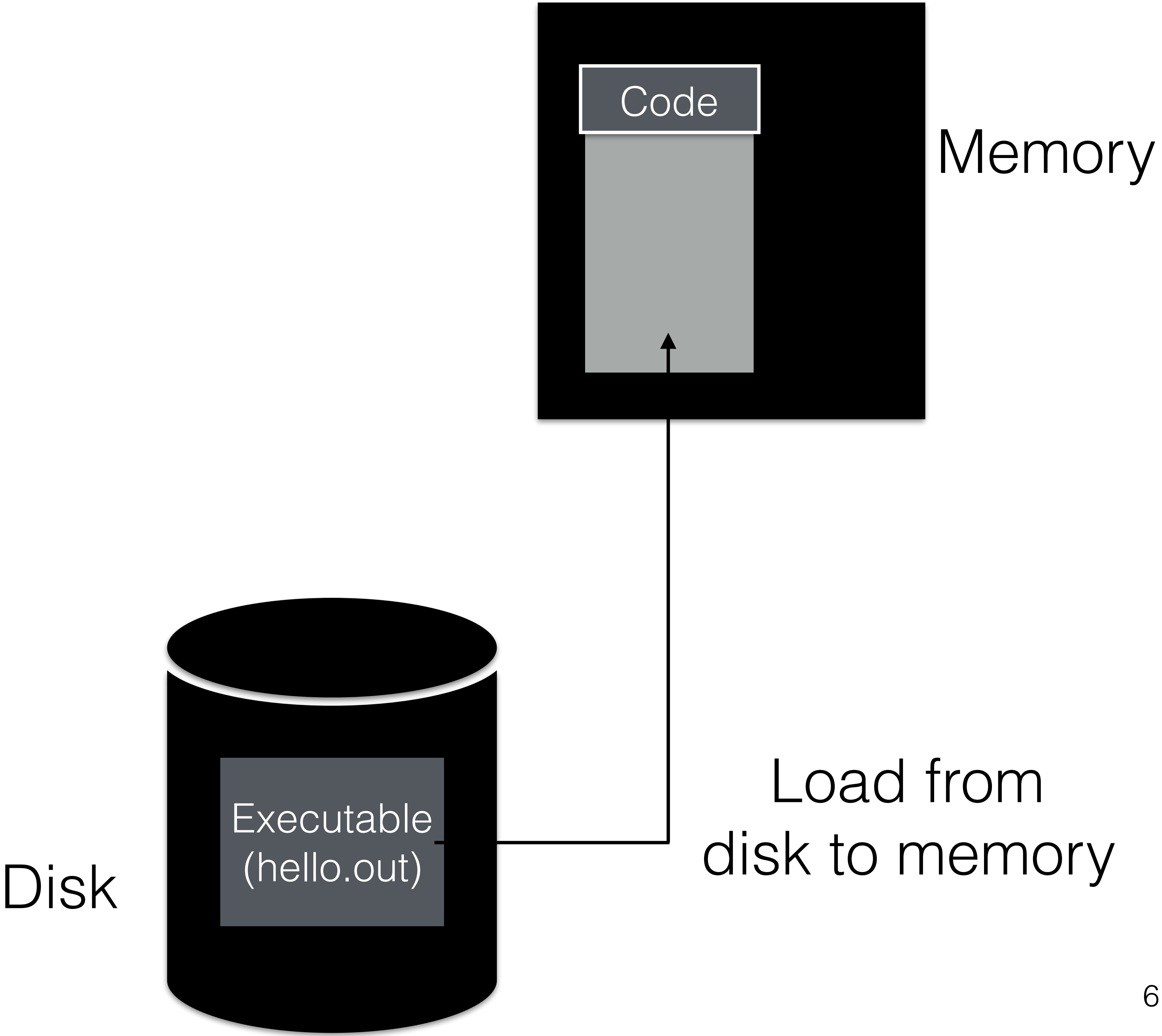

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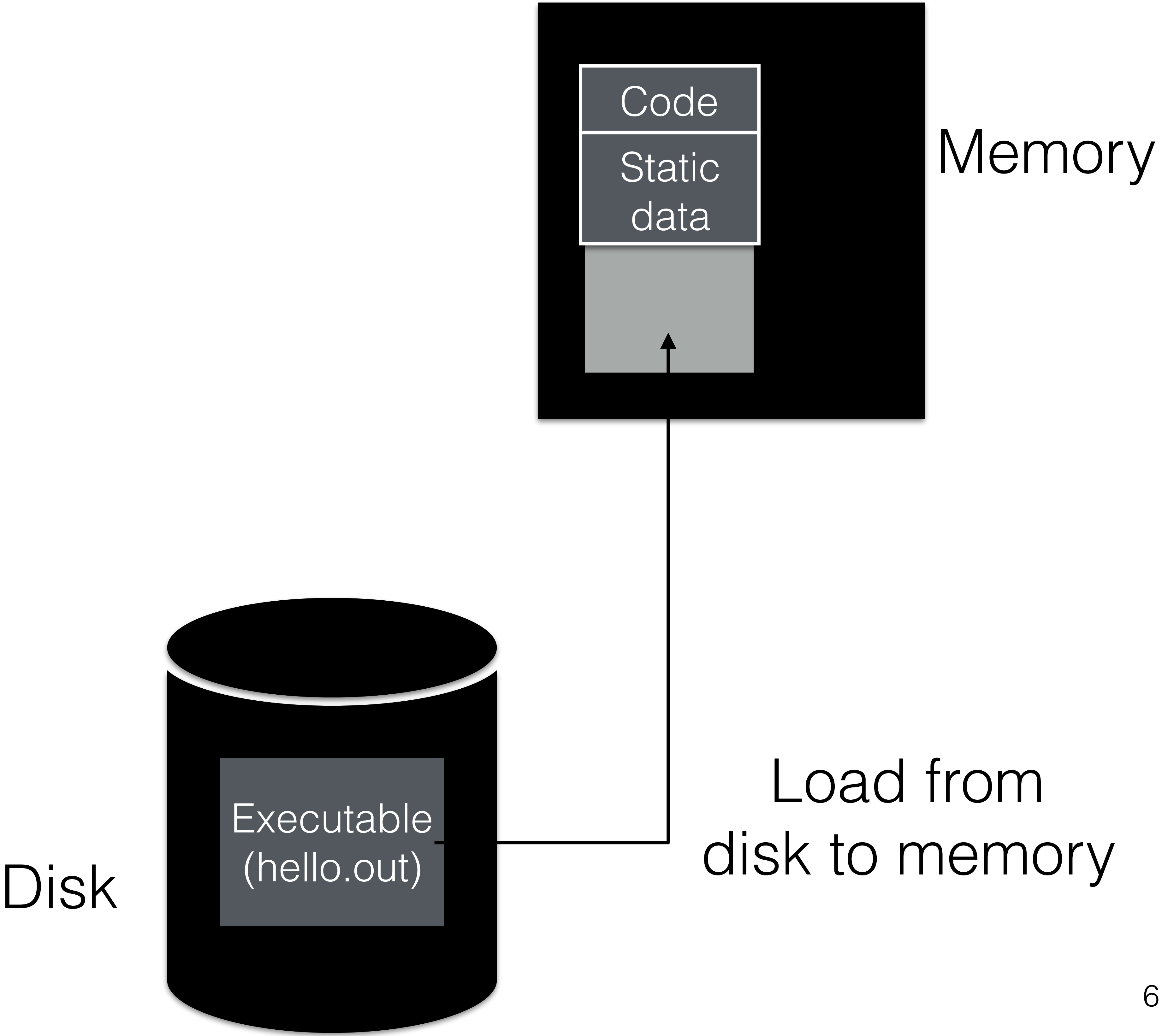

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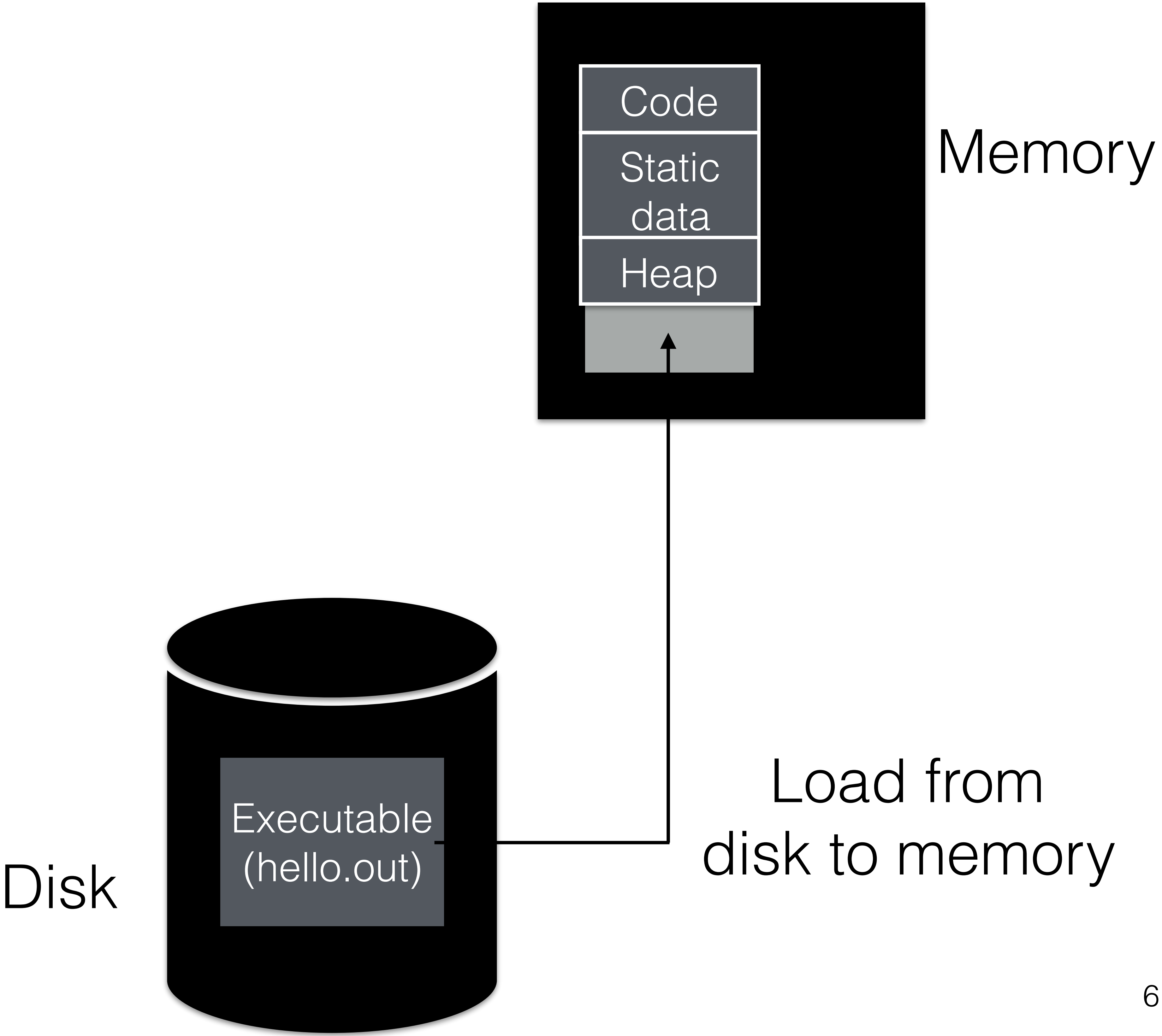

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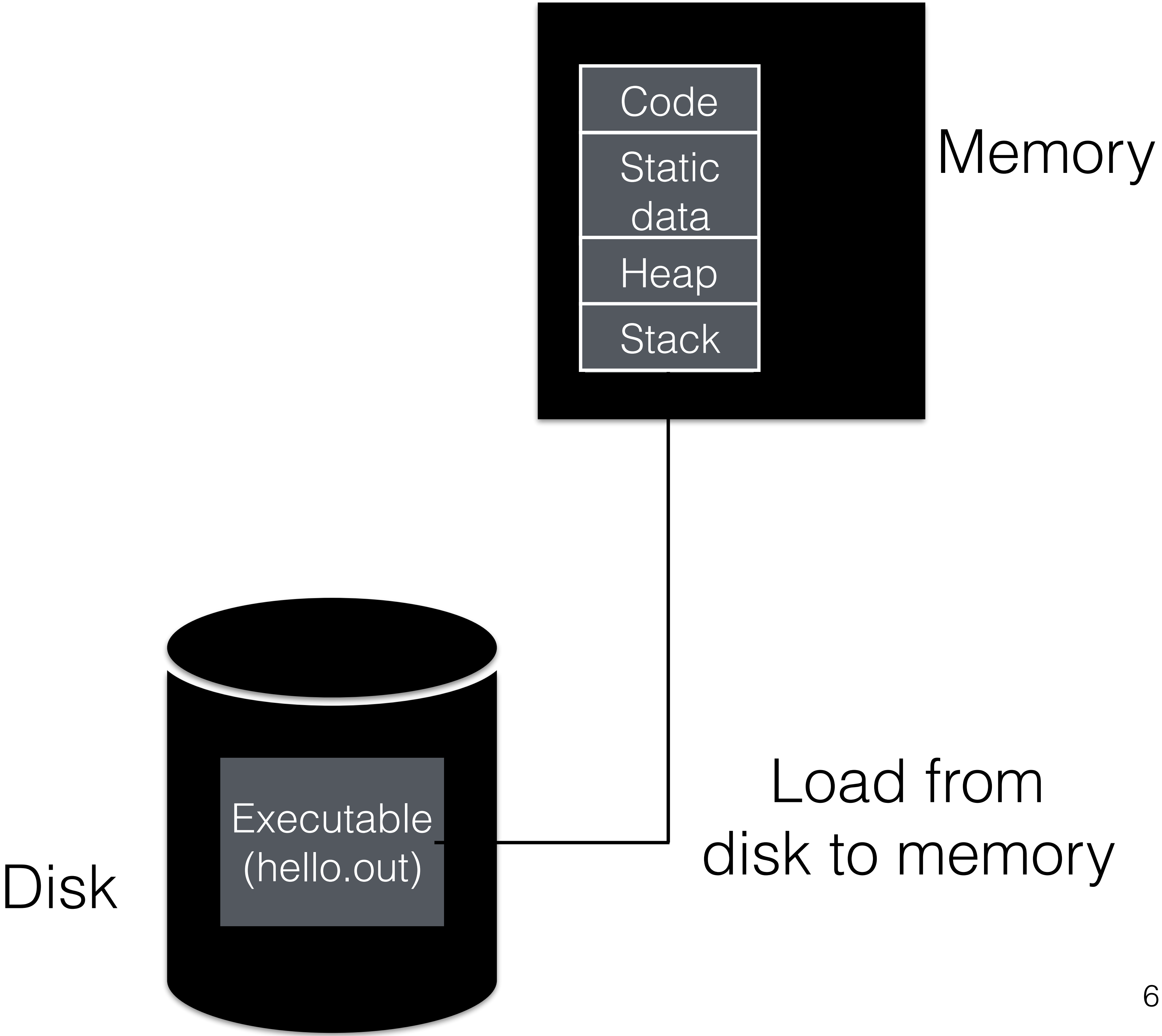

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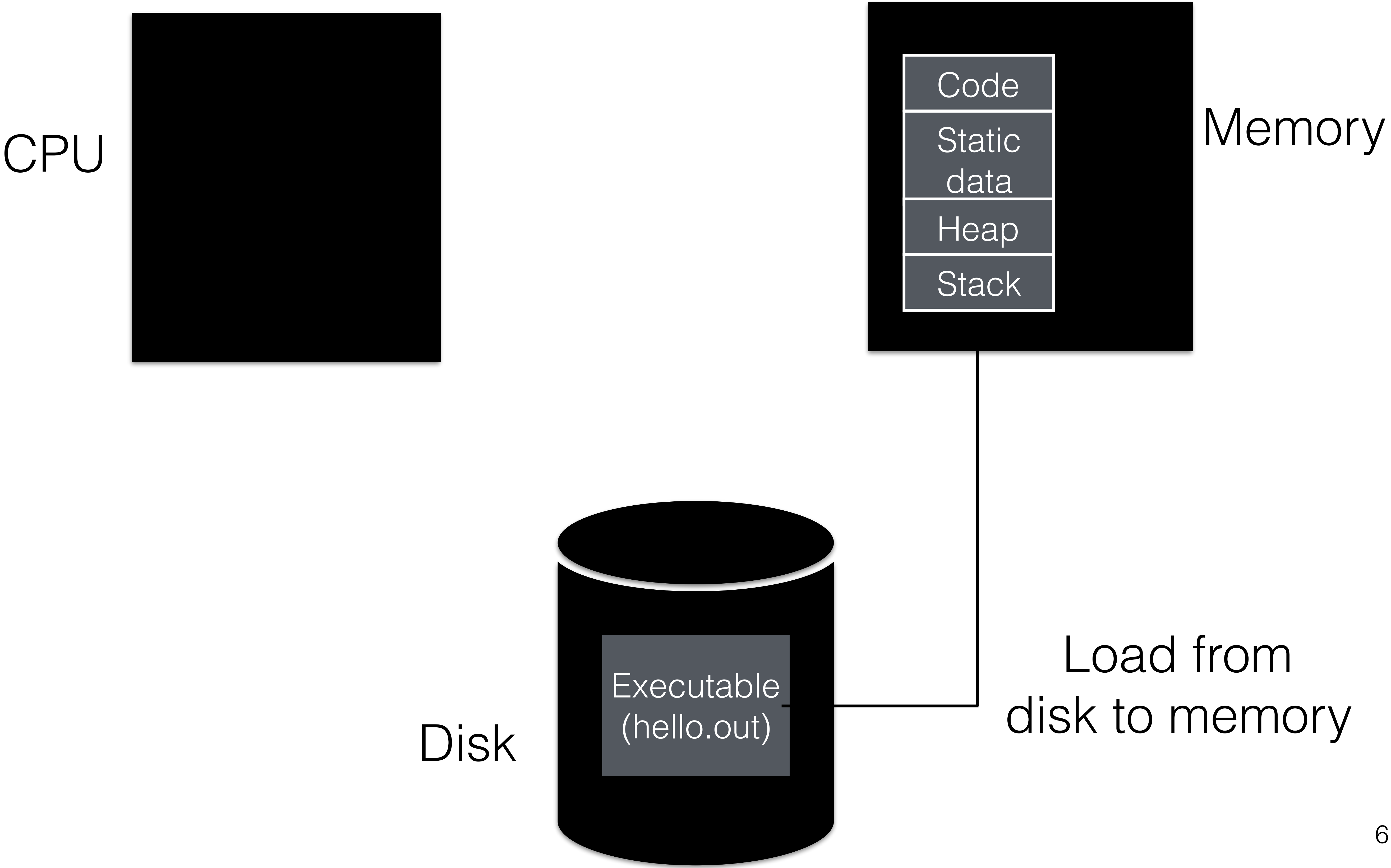

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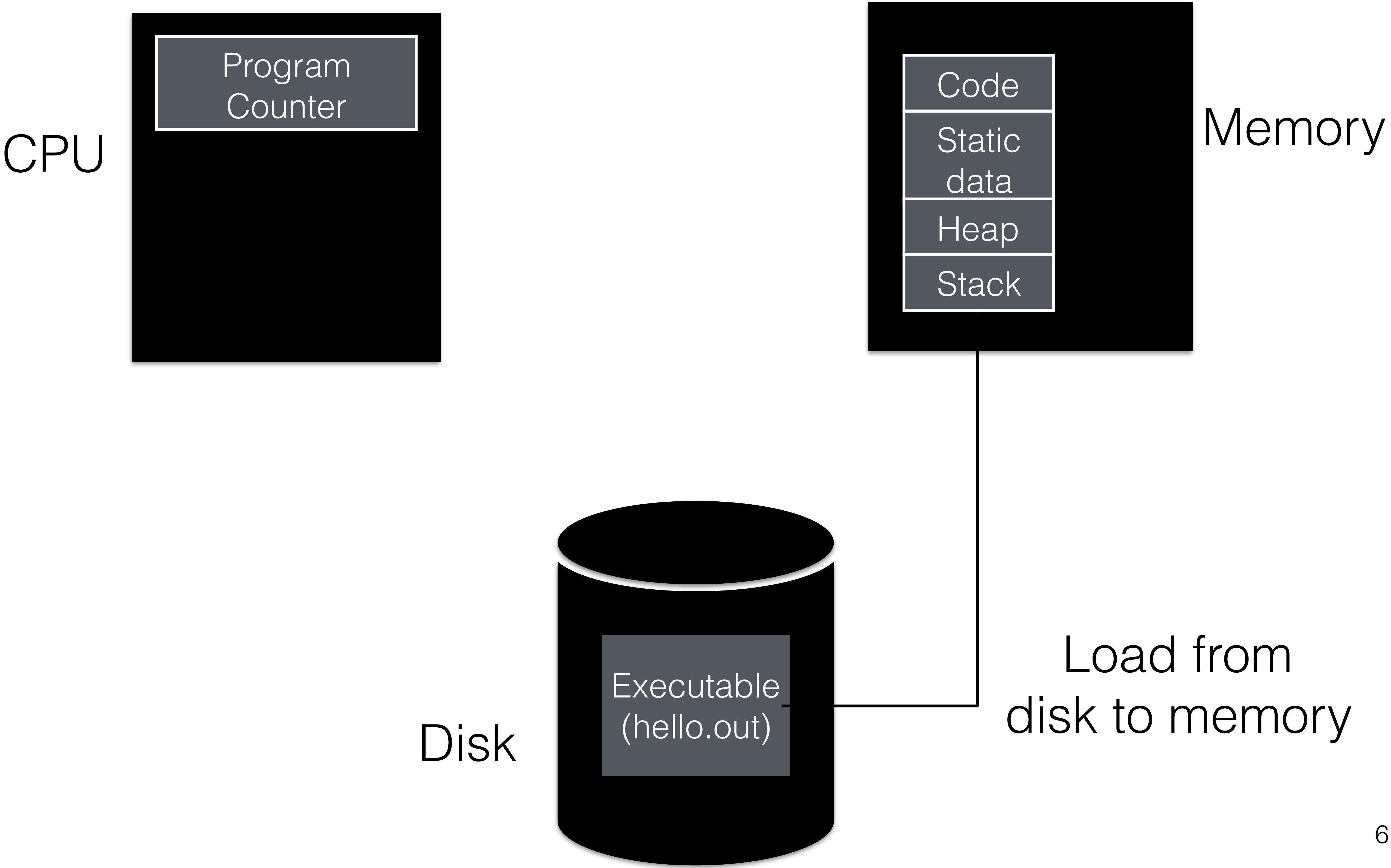

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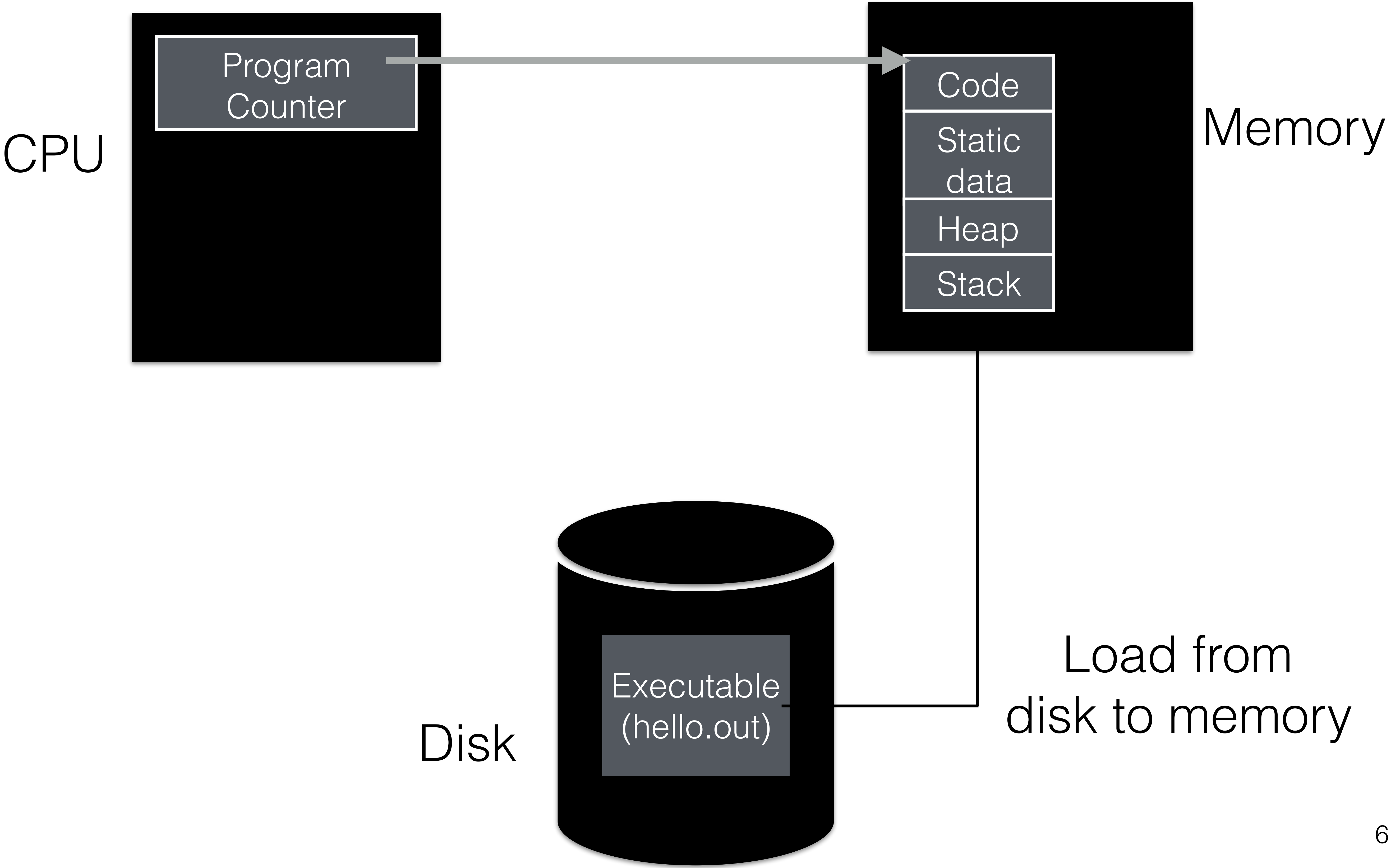

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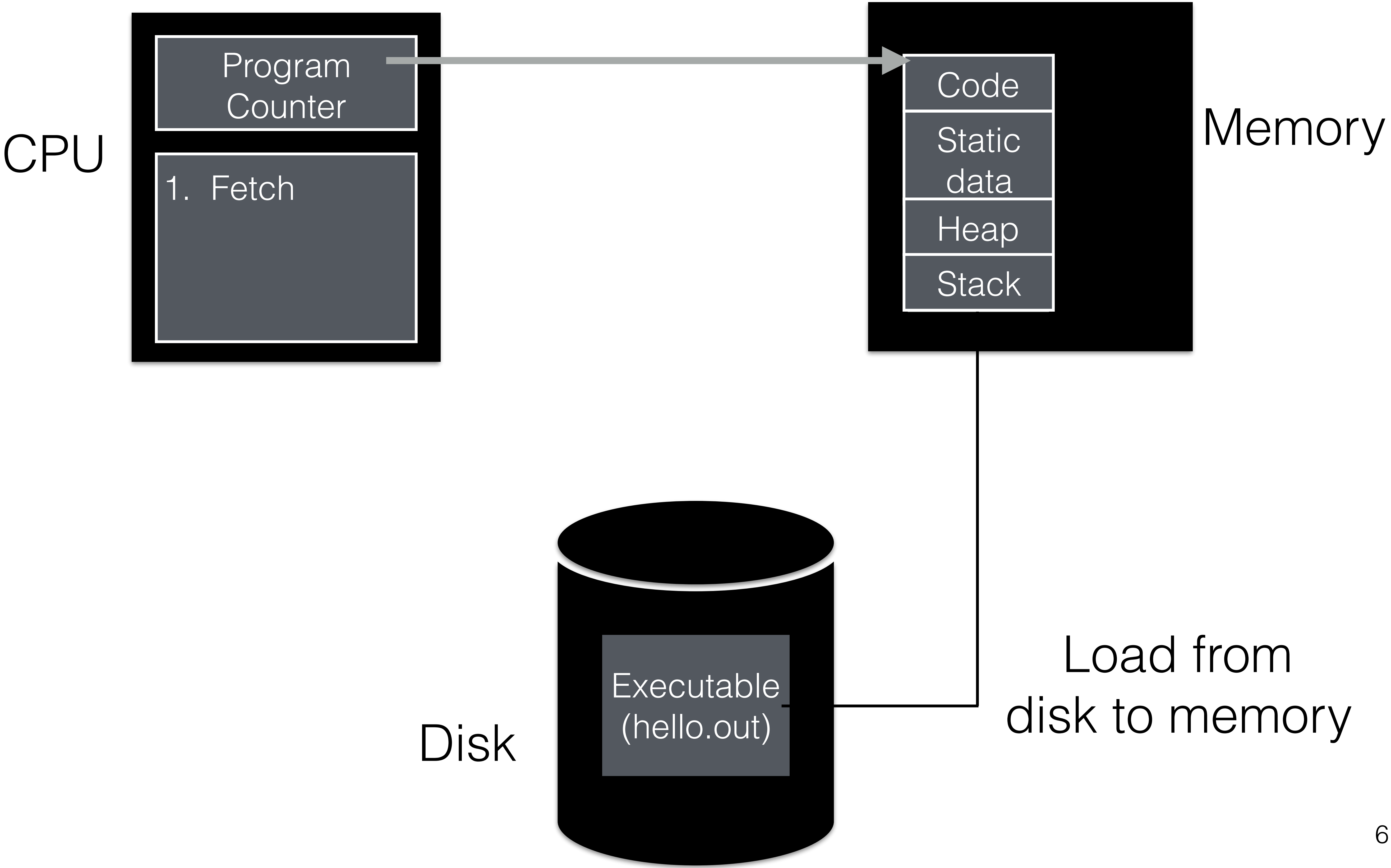


CPU

Program Counter

1. Fetch

Code

Static data

Heap

Stack

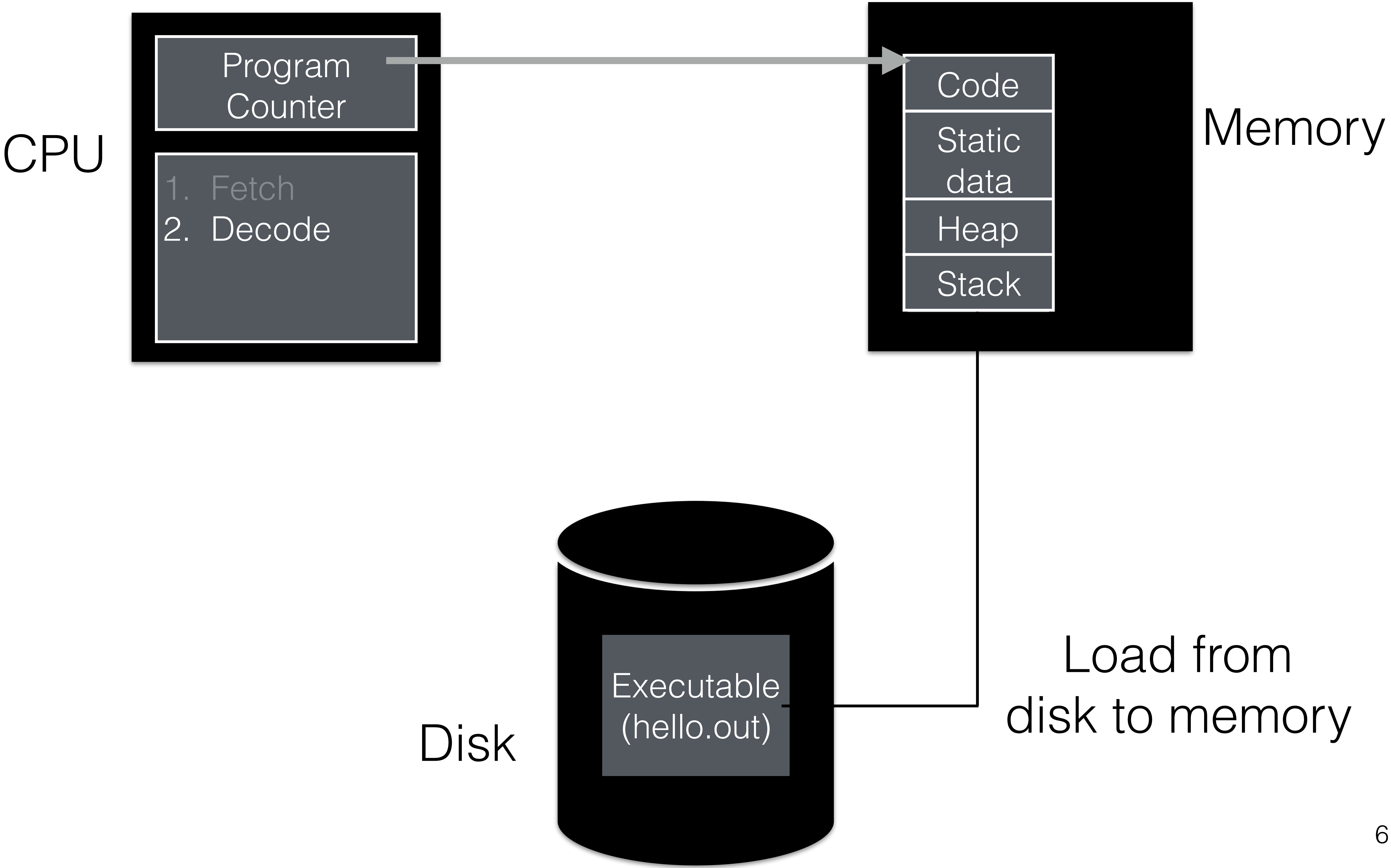
Memory

Disk

Executable (hello.out)

Load from disk to memory

Process Execution



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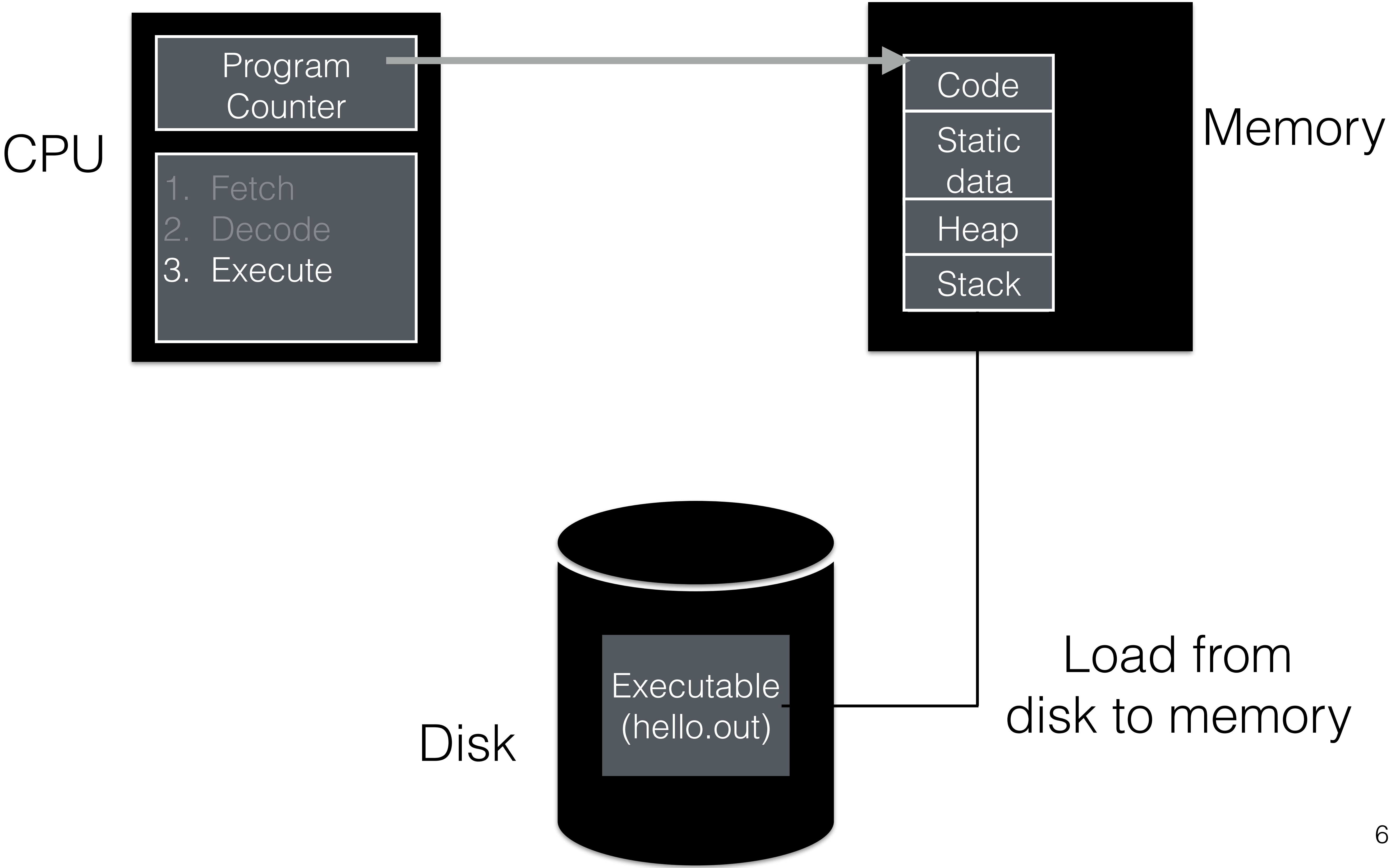

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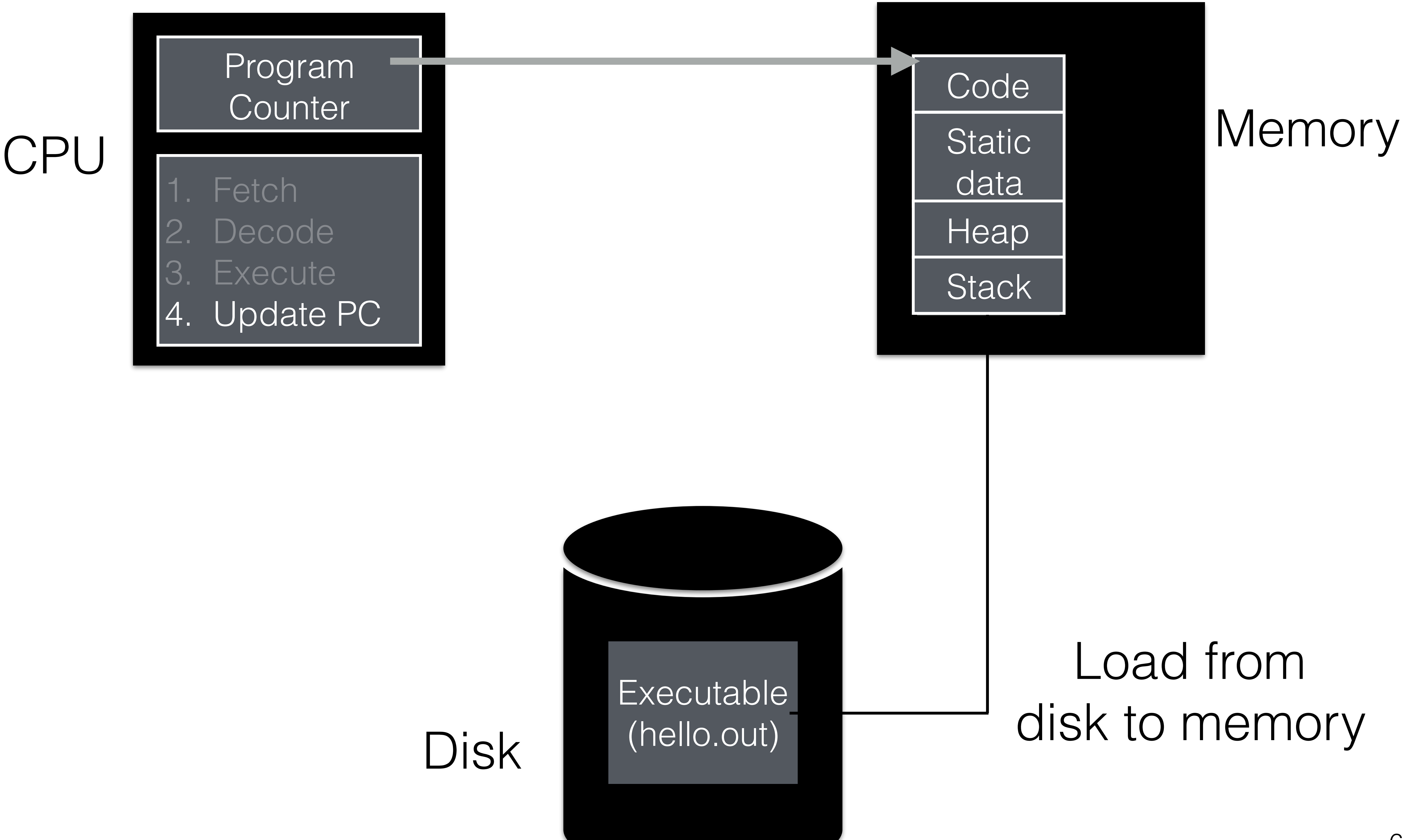

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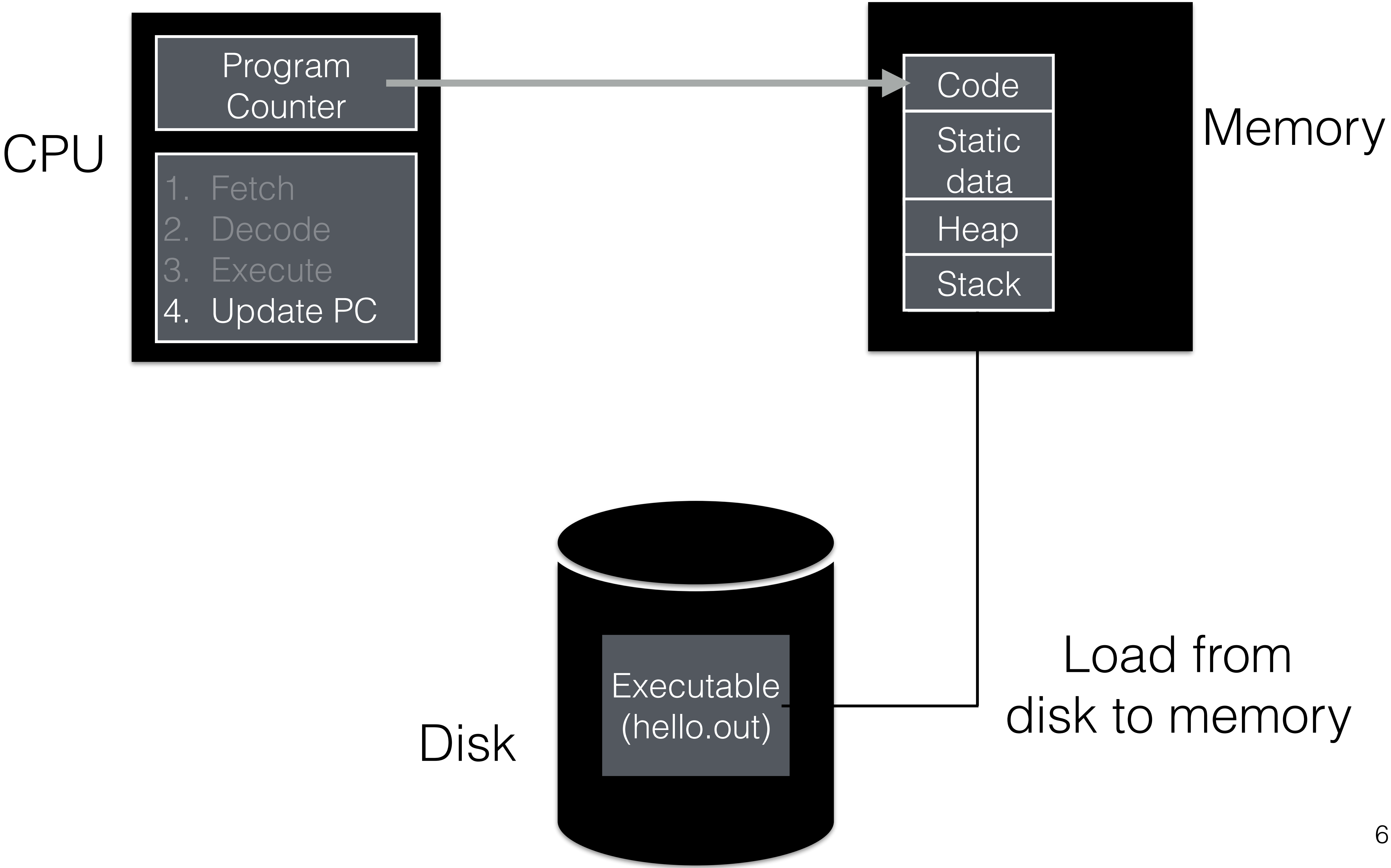

CPU Virtualisation

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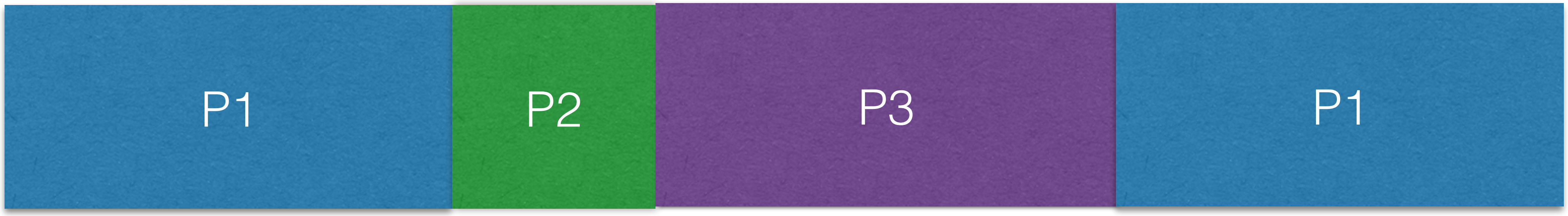

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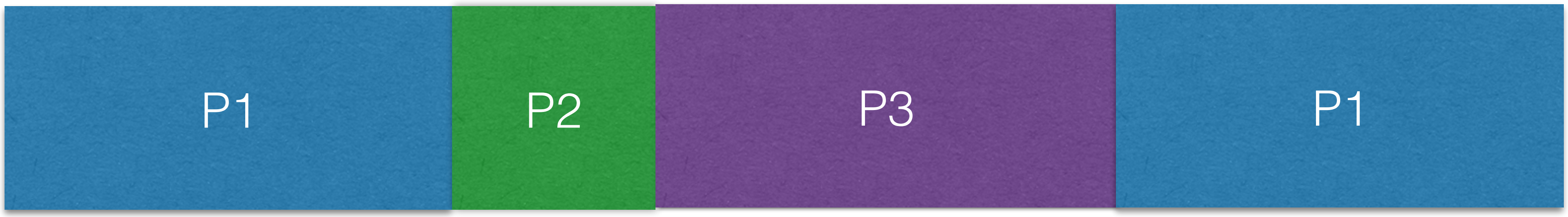

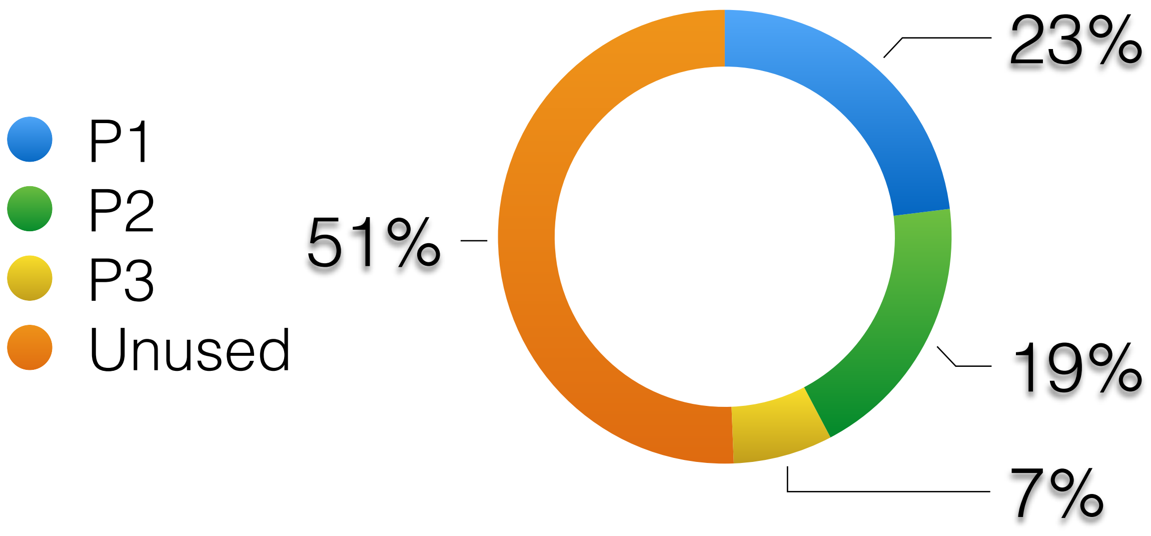

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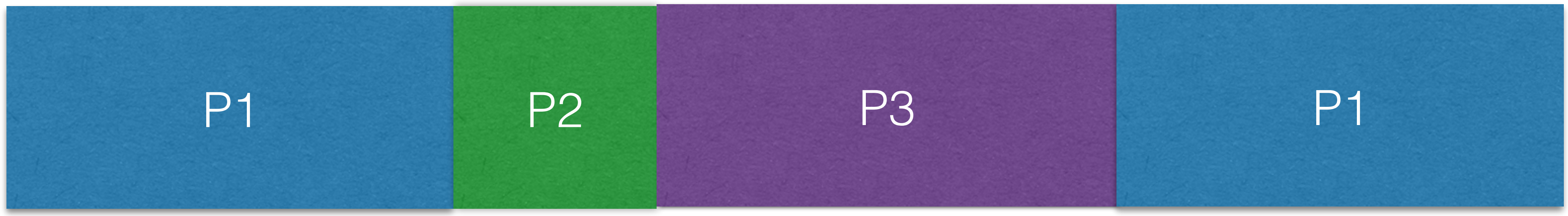
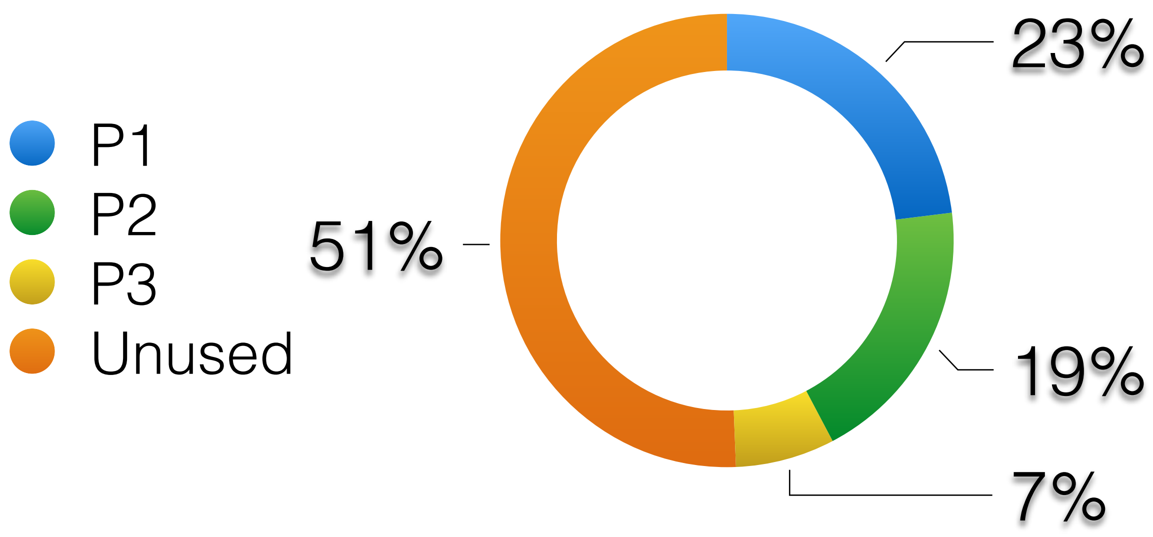
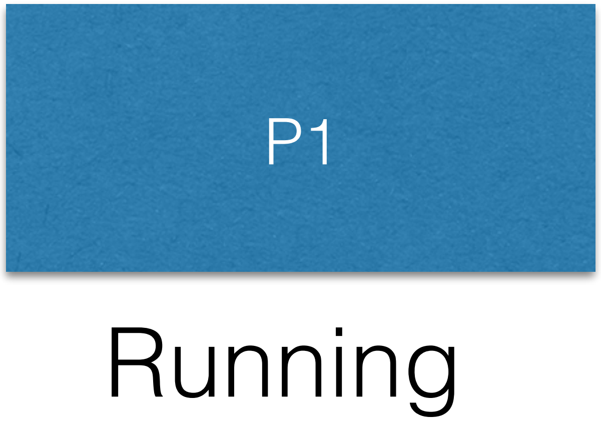




Space sharing for memory

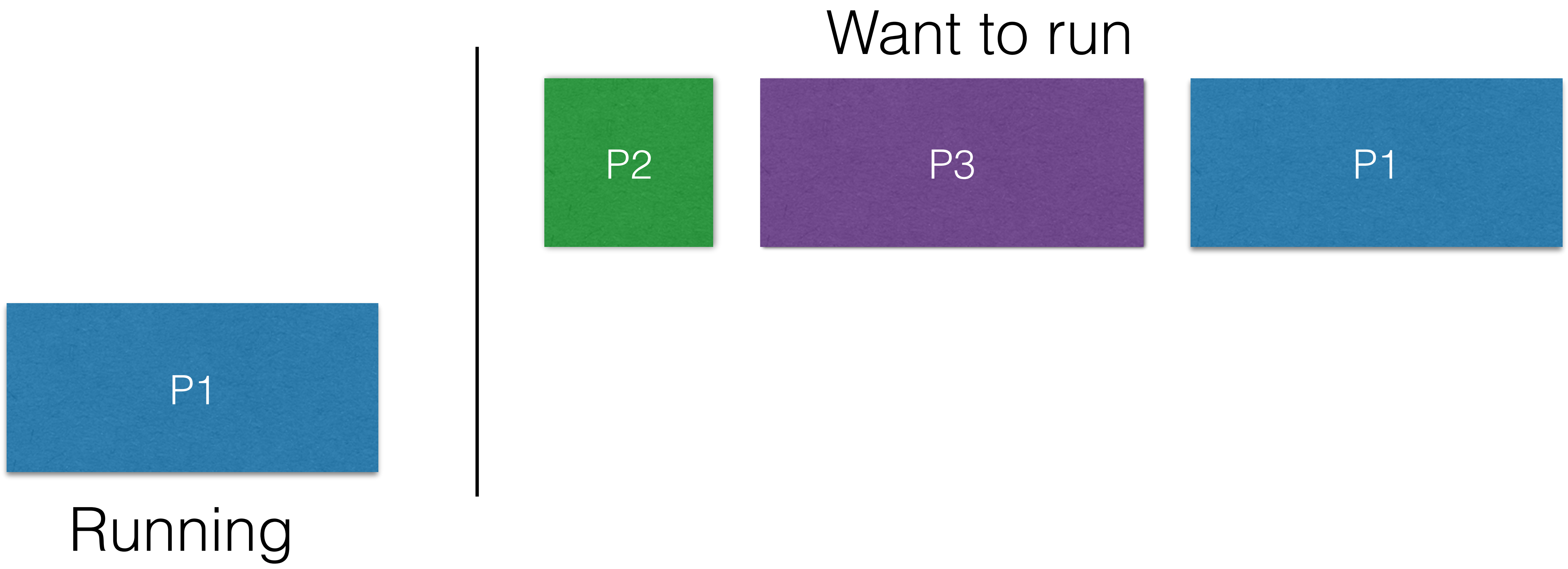
CPU Virtualisation II



P1

Running

CPU Virtualisation II



Want to run

P2

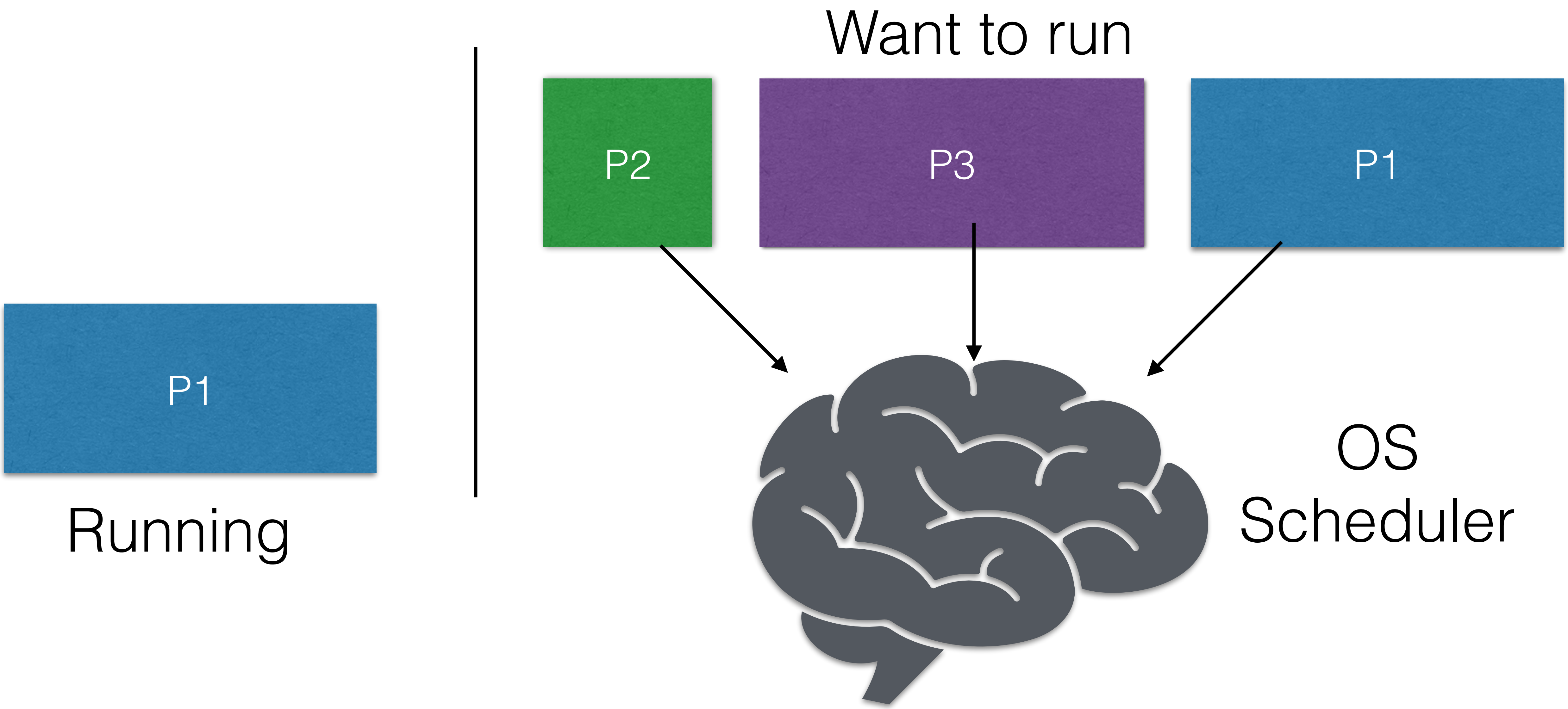
P3

P1

P1

Running

CPU Virtualisation II



P1

Running

Want to run

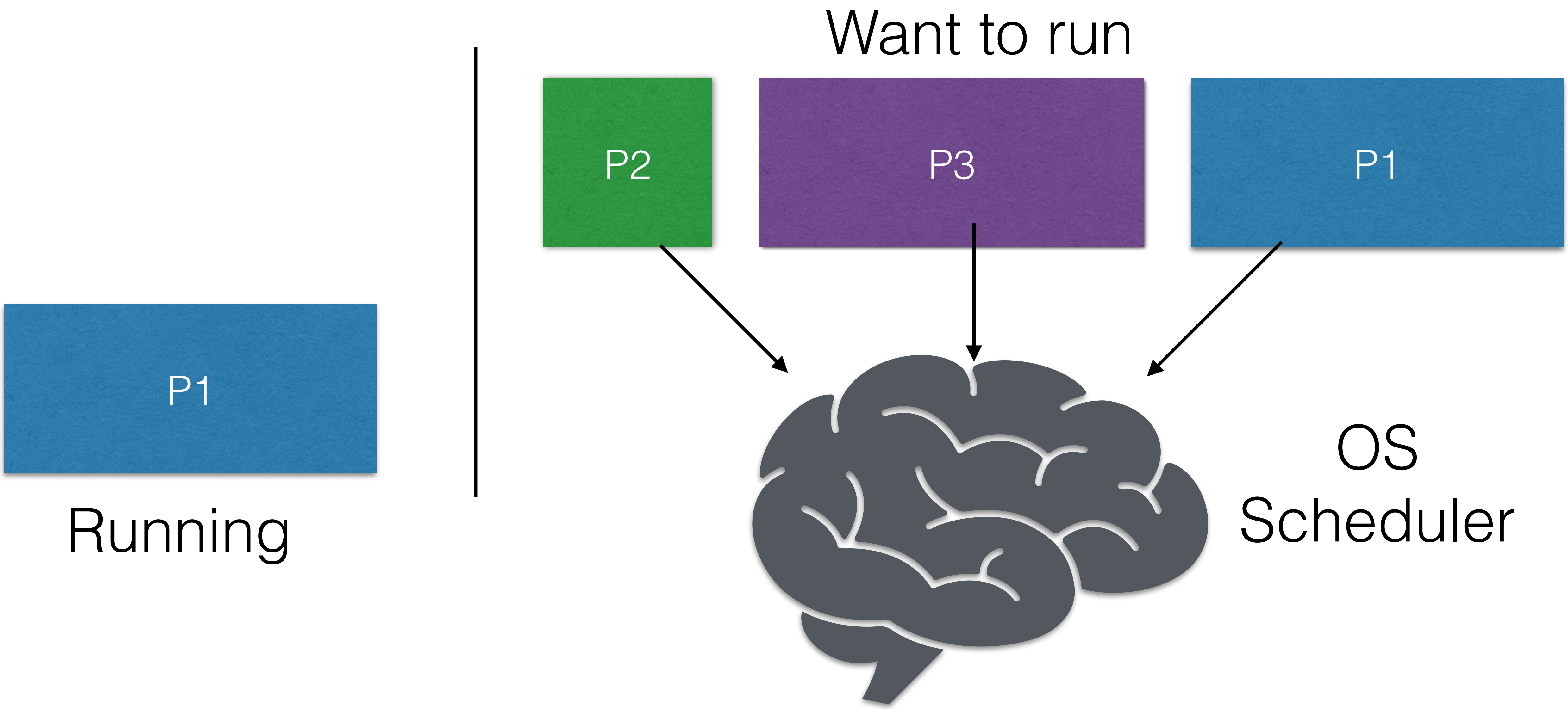
P2

P3

P1

OS Scheduler

CPU Virtualisation II



P1

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Want to run

P2

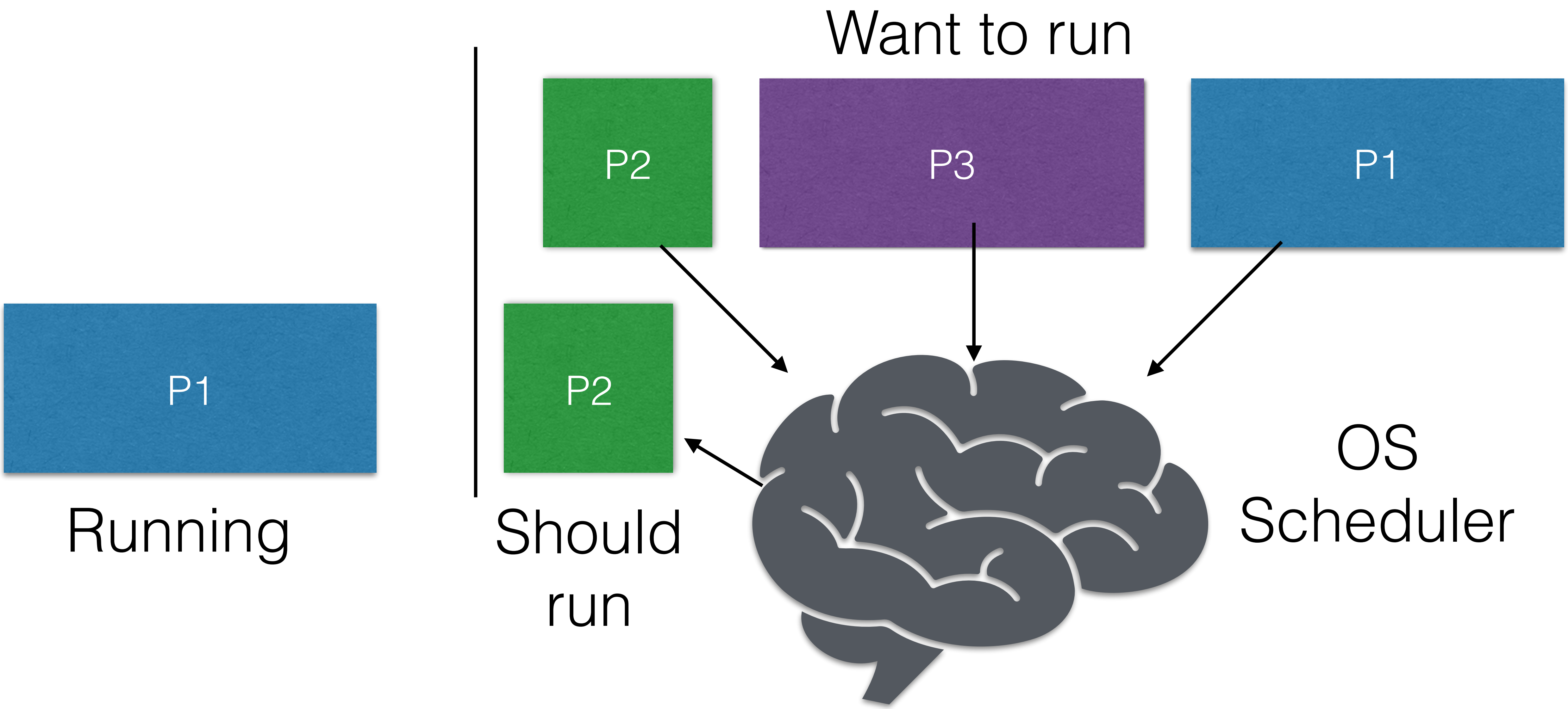
P3

P1

OS Scheduler

Next P = f(run time, metric, type of process, …)

CPU Virtualisation II



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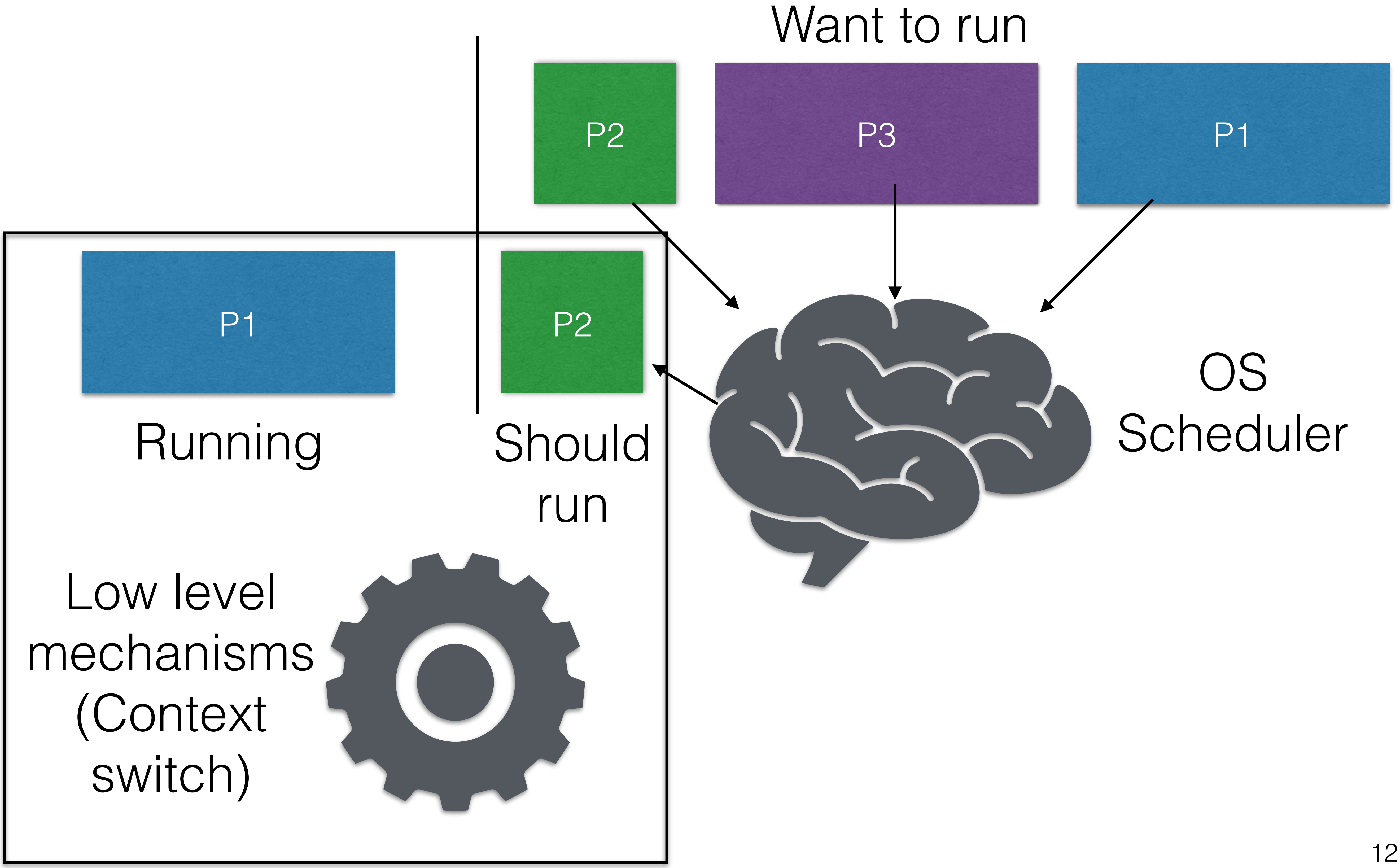

Want to run

Running

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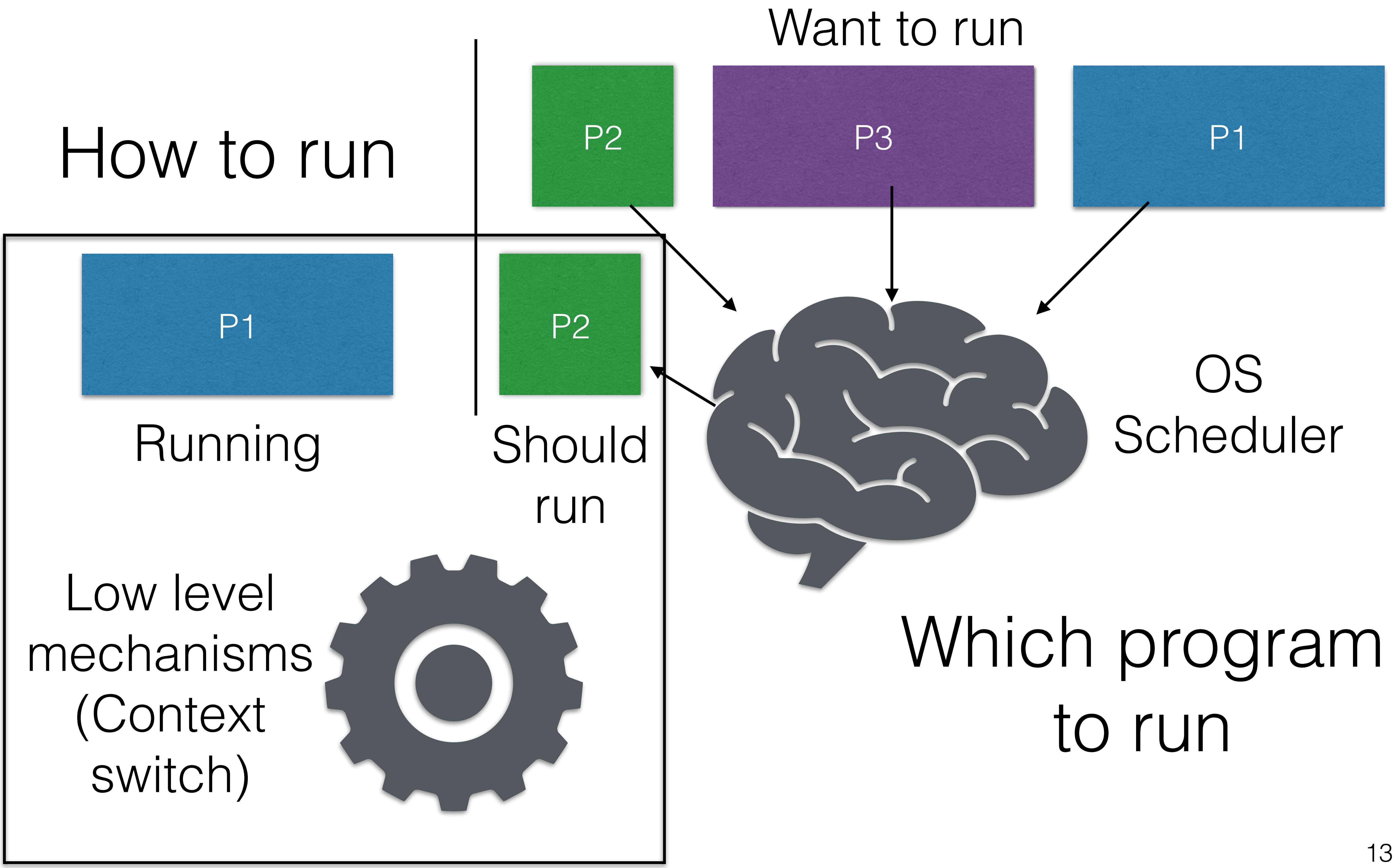
OS Scheduler

Low level mechanisms (Context switch)

CPU Virtualisation II



Want to run

P2

P3

P1

How to run

P1

Running

P2

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OS Scheduler

Low level mechanisms (Context switch)

Which program to run

Process API

Process API

- Create process:

Process API

- Create process:
  - Double click

Process API

- Create process:
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    - Run on command line

Process API

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- Destroy processes:

Process API

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Process API

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- Wait:

Process API

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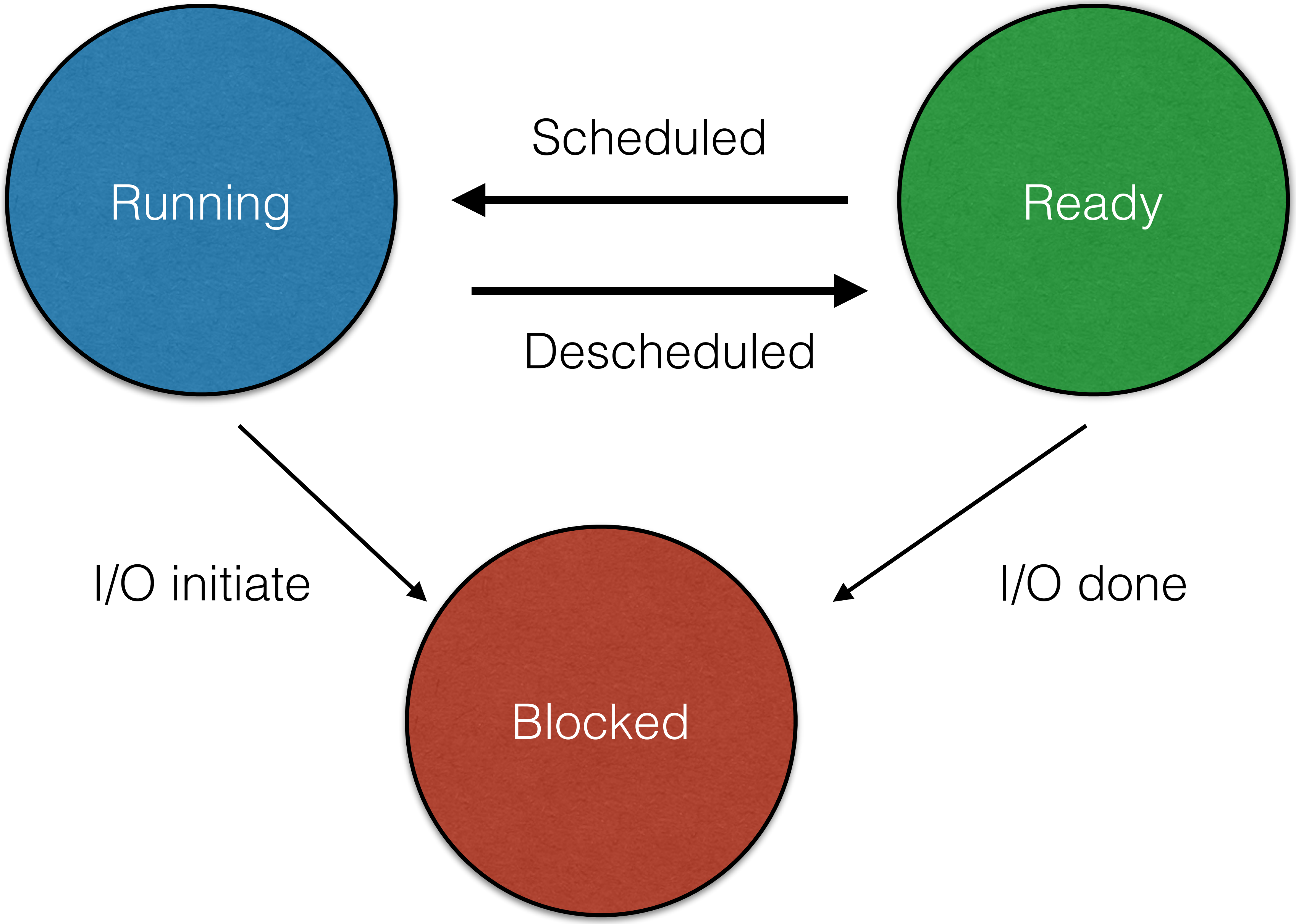

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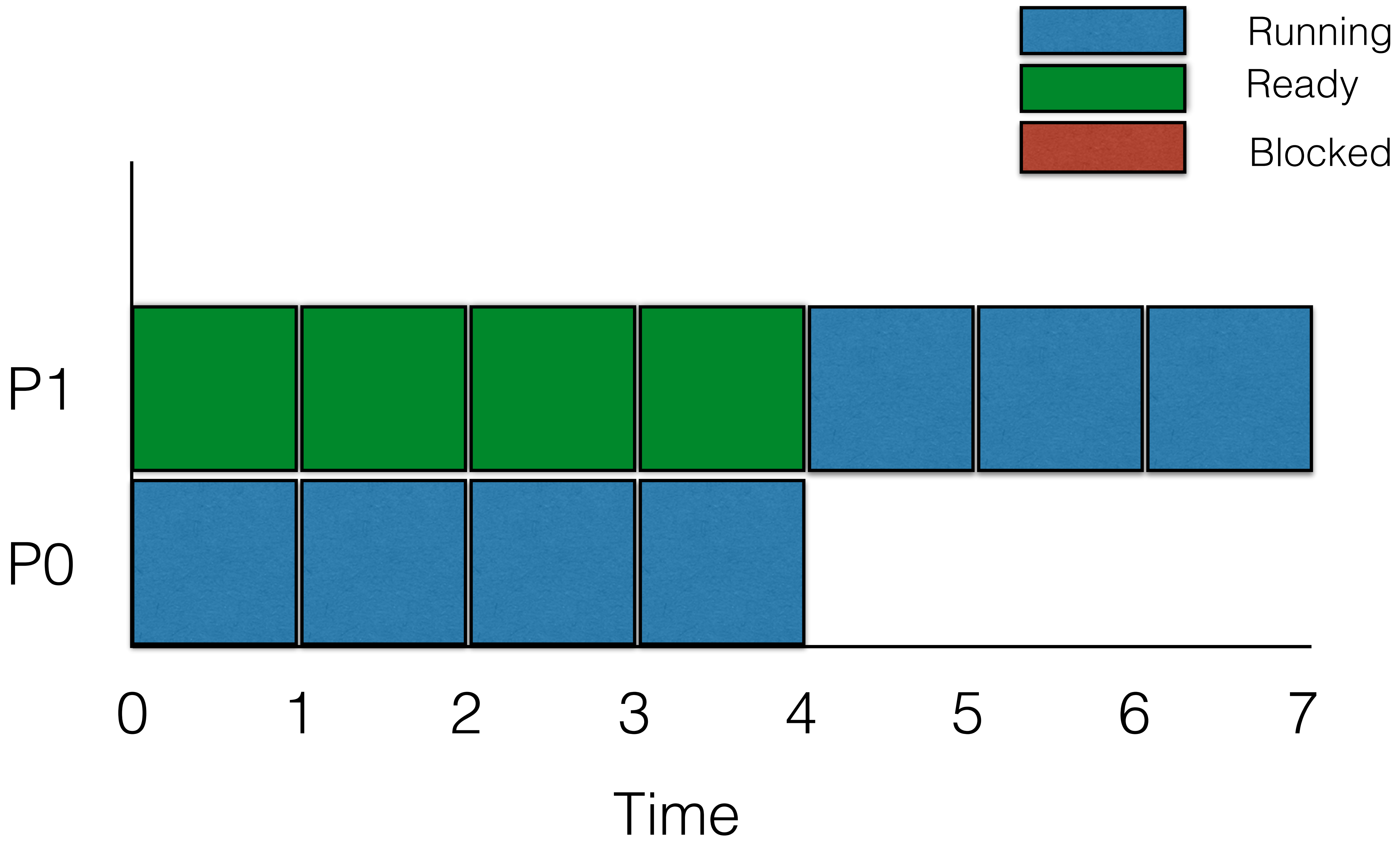

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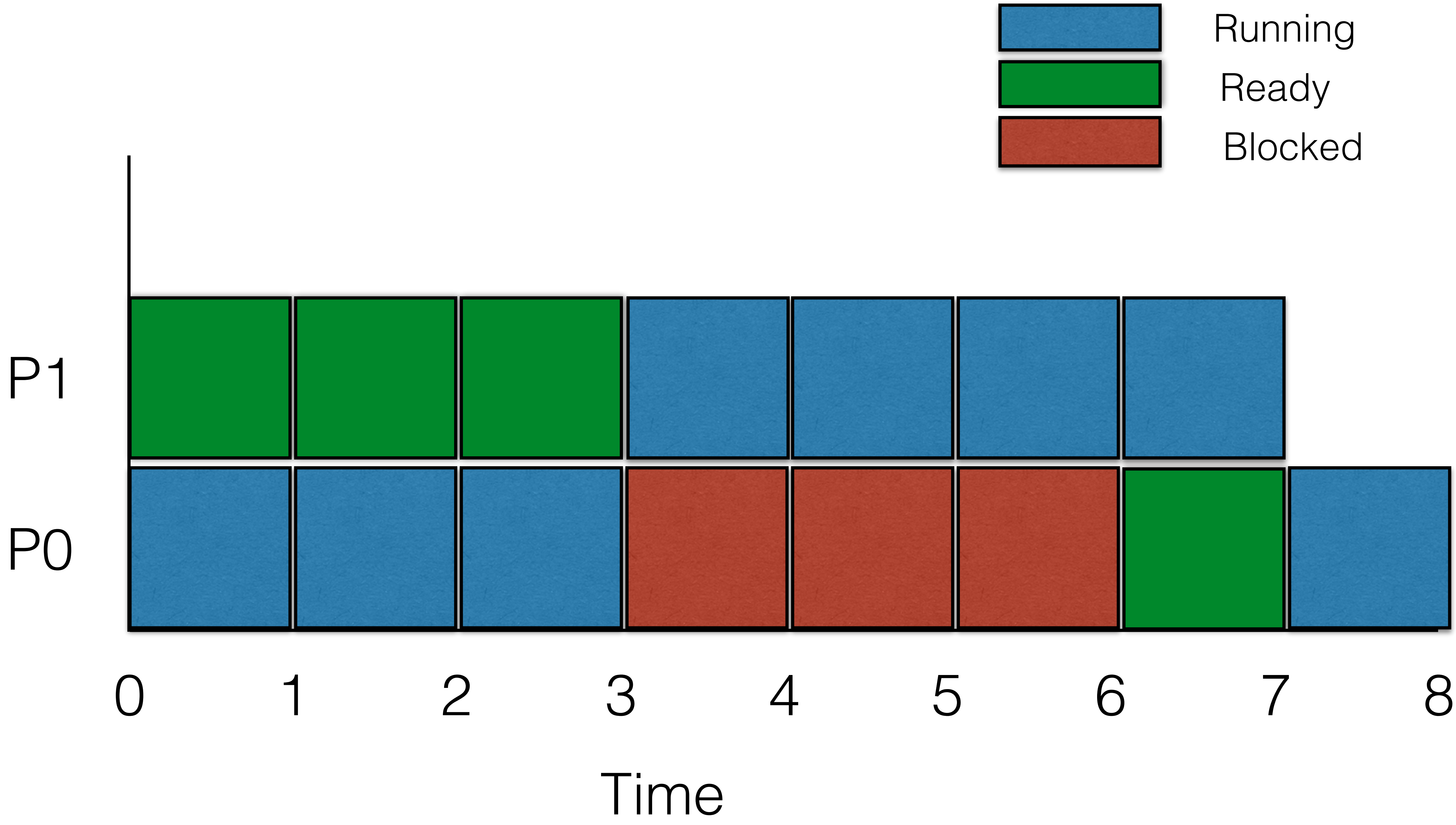
Running
Ready
Blocked
P1
P0
Time