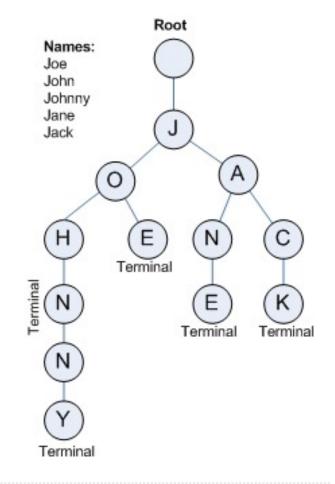
61A Extra Lecture 7

Announcements

Prefix Trees

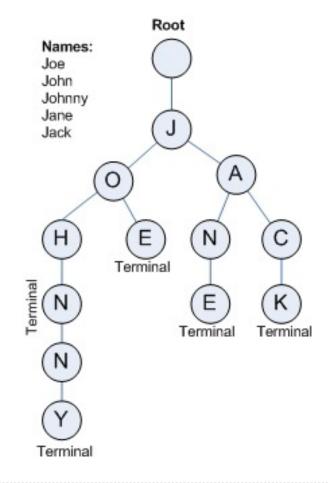
A prefix tree (or just "trie") indexes words by prefix

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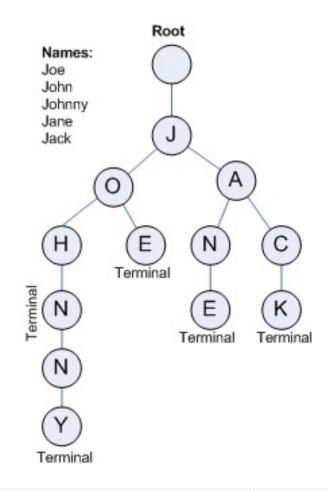
lookup: Follow a path from the root using a prefix, then enumerate everything below the resulting node



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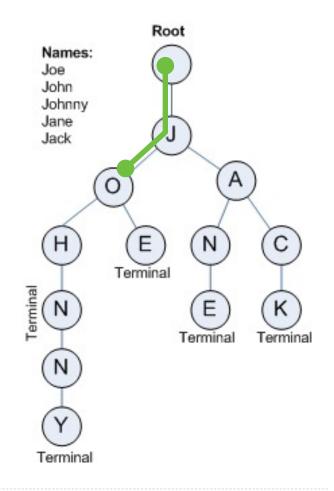
Example: "J0"



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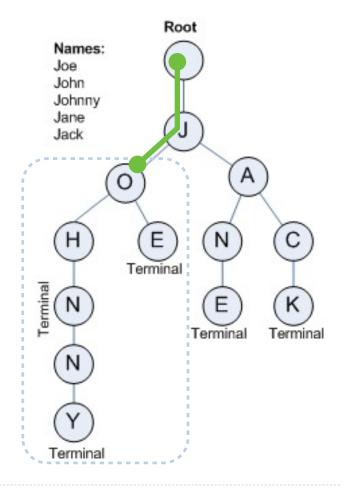
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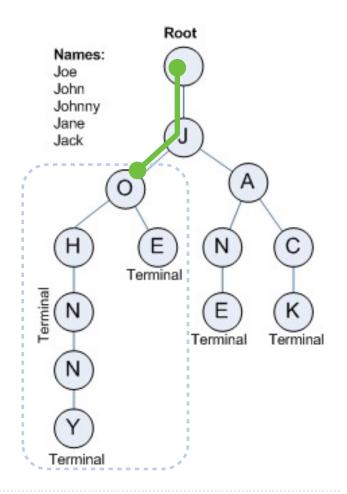


A prefix tree (or just "trie") indexes words by prefix

lookup: Follow a path from the root using a prefix, then enumerate everything below the resulting node

Example: "J0"

add: Follow a path from the root using a word, adding branches for each new letter until the end is reached



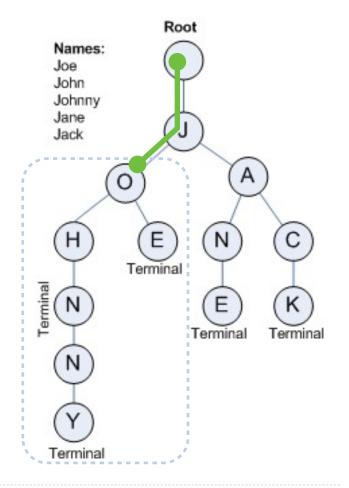
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Example: "JANET"



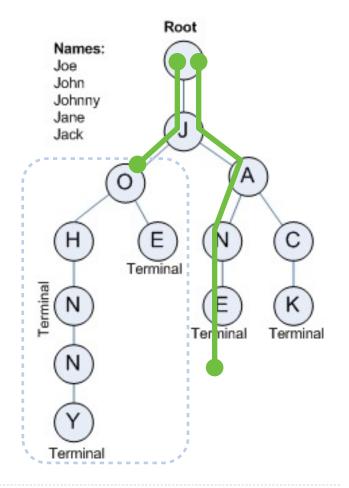
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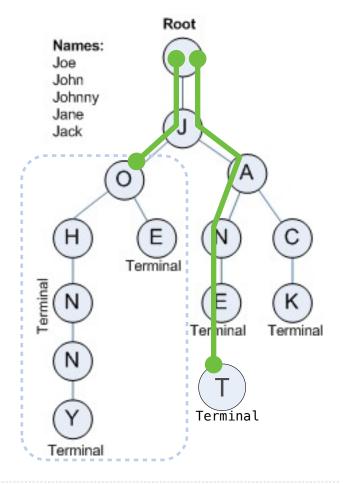
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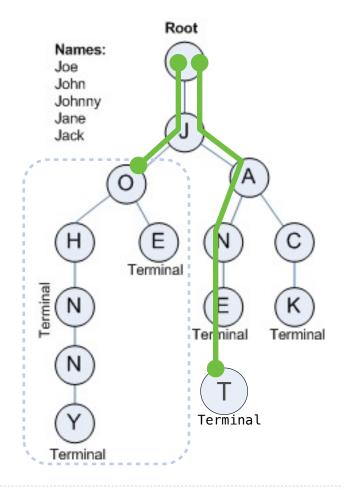
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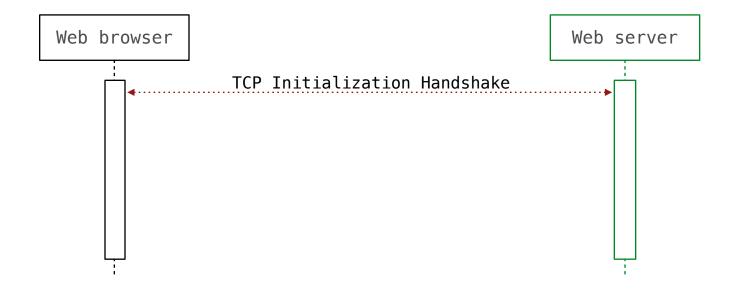
Example: "JANET"

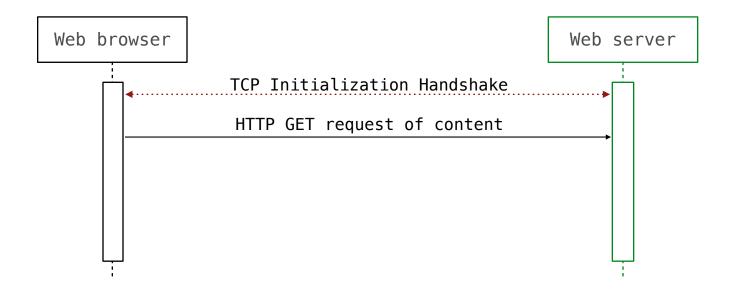
(Demo)



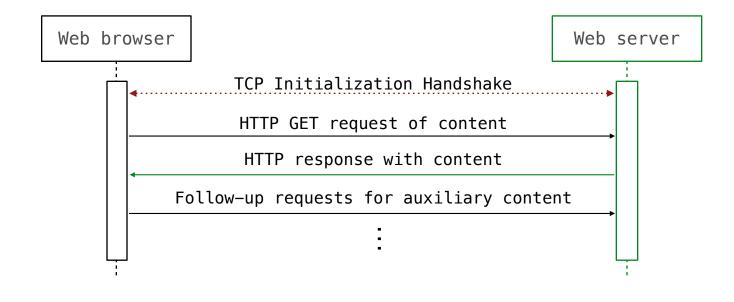
Flask

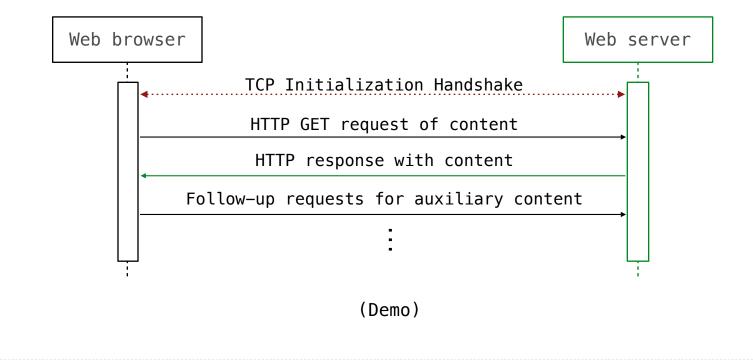
Translates HTTP requests (described in a future lecture) to Python function calls











A thread executes a function call

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Multiple threads can execute different calls simultaneously

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For high-latency operations such as web requests, threading can increase speed enormously

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(Demo)

Shared State and Race Conditions

When multiple threads make changes to the same object, the result can be unpredictable

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When multiple threads make changes to the same object, the result can be unpredictable

x = 10

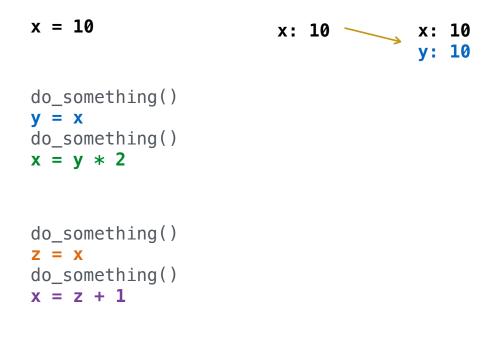
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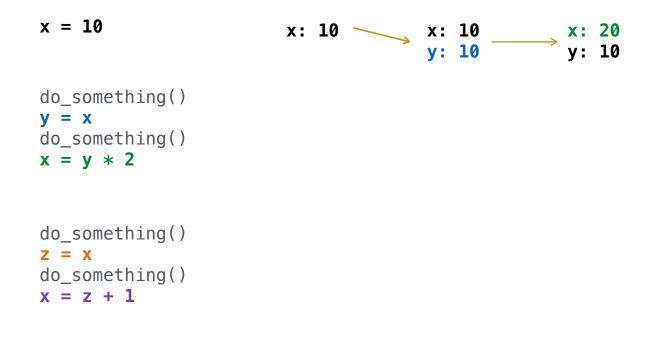
do_something()

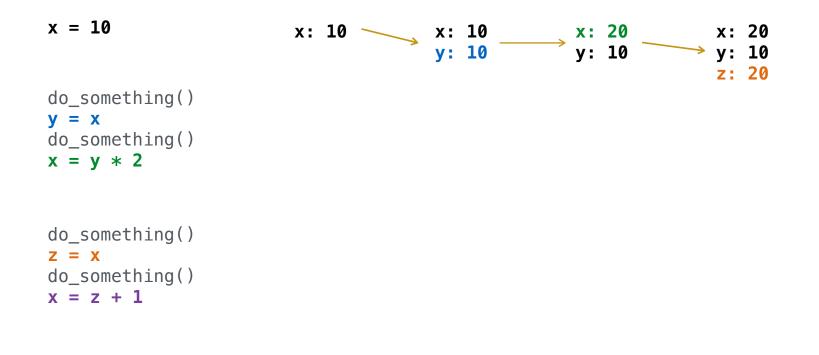
x = 10

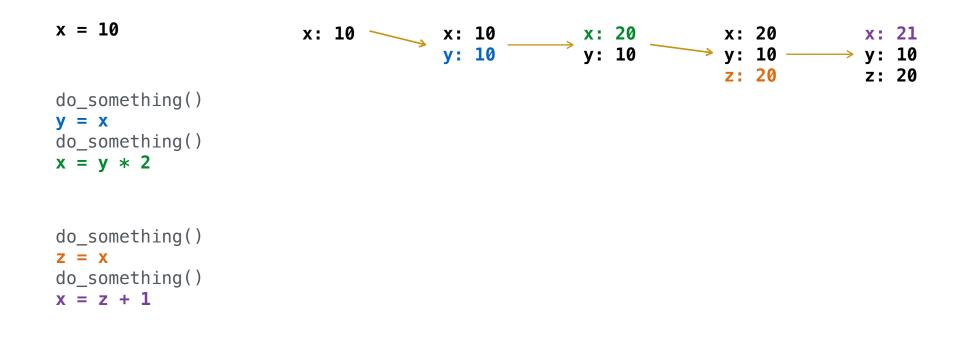
```
y = x
do_something()
x = y * 2
```

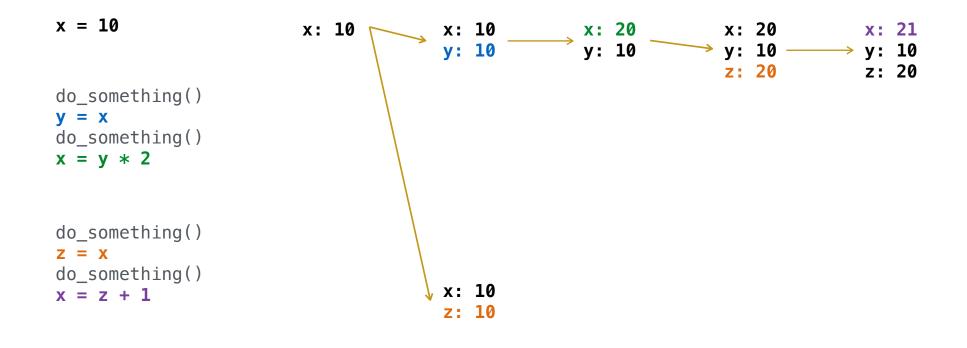
```
x = 10
do_something()
y = x
do_something()
x = y * 2
do_something()
z = x
do_something()
x = z + 1
```

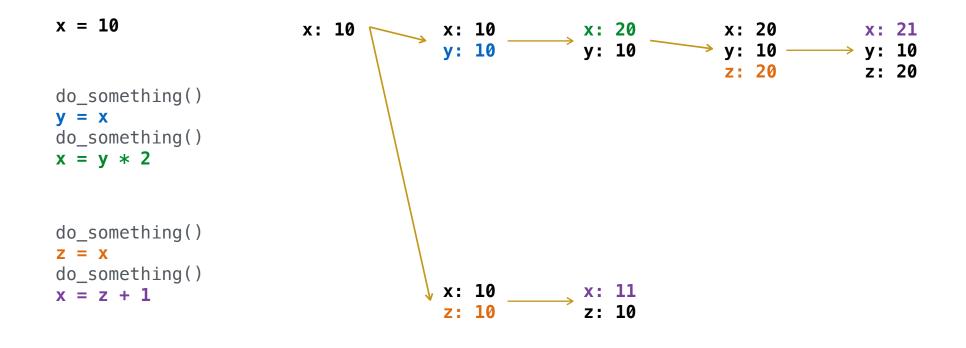


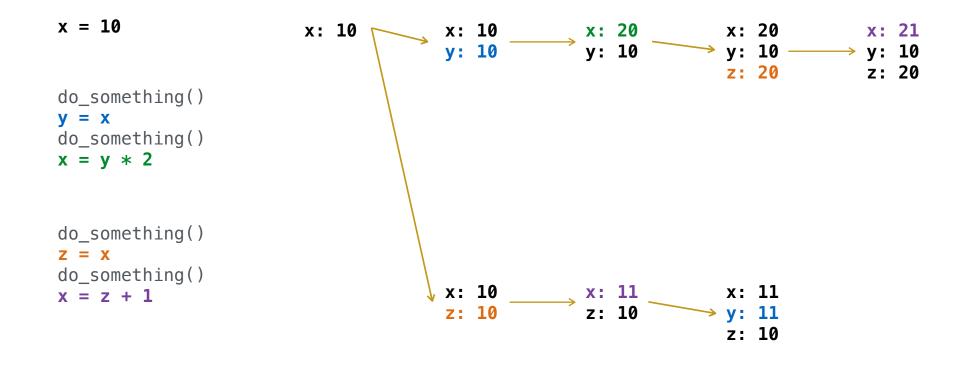




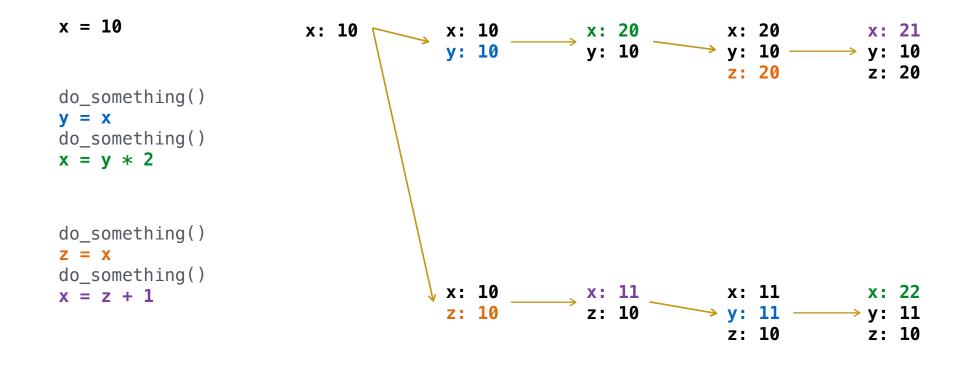






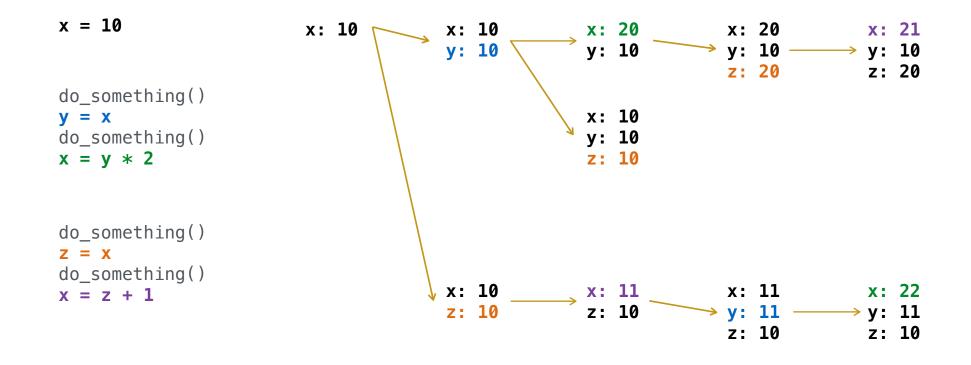


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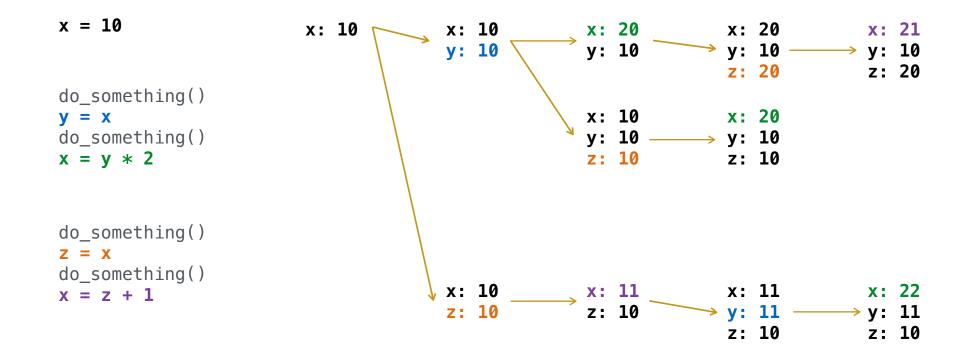


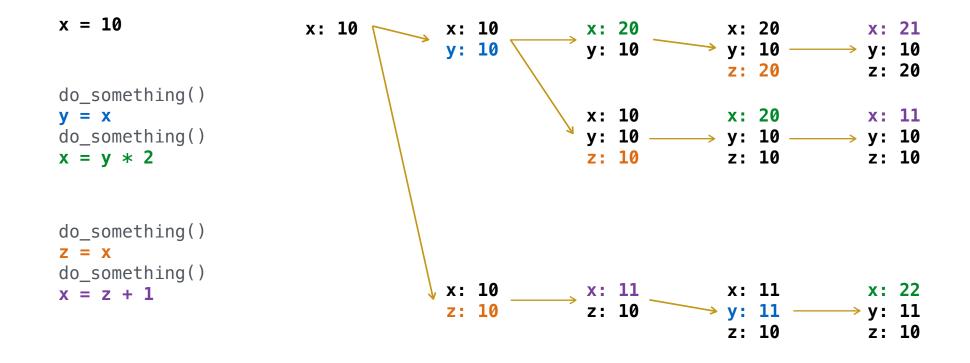
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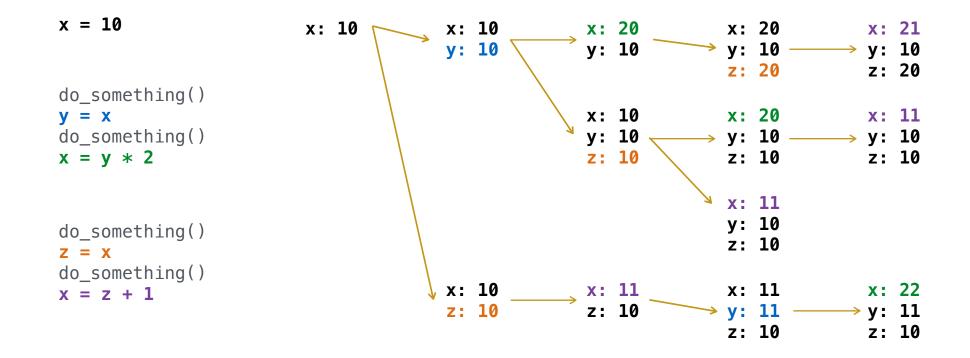
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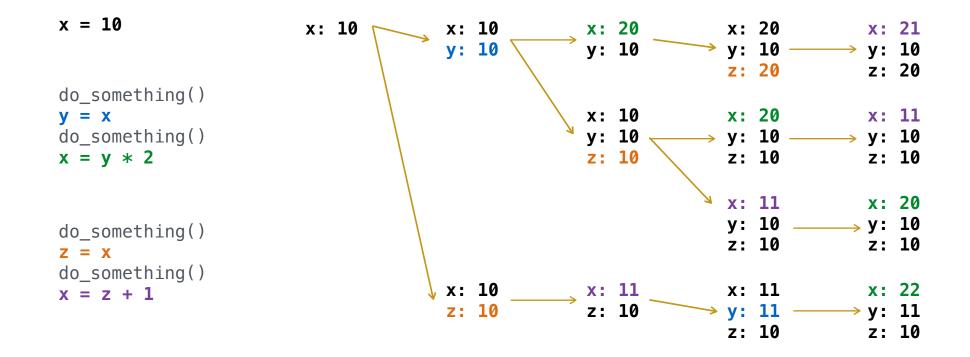


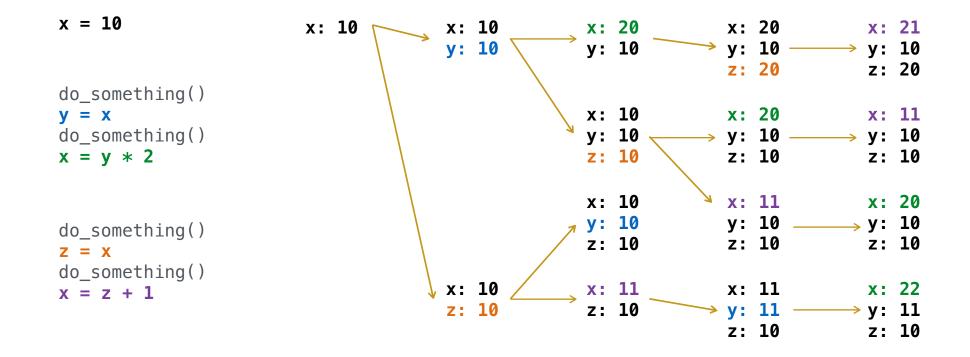
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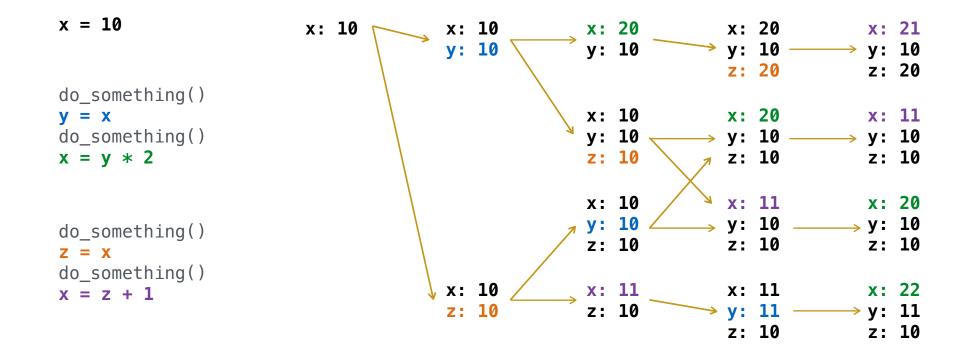












A critical section is a sequence of statements that should be executed atomically

x = 10 s = Lock()

```
x = 10
s = Lock()
do_something()
s.acquire()
y = x
do_something()
x = y * 2
s.release()
```

```
x = 10
s = Lock()
do_something()
s.acquire()
y = x
do_something()
x = y * 2
s.release()
do_something()
z = x
do_something()
x = z + 1
s.release()
```

