

61A Extra Lecture 7

Announcements

Prefix Trees

All Words That Share a Prefix

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

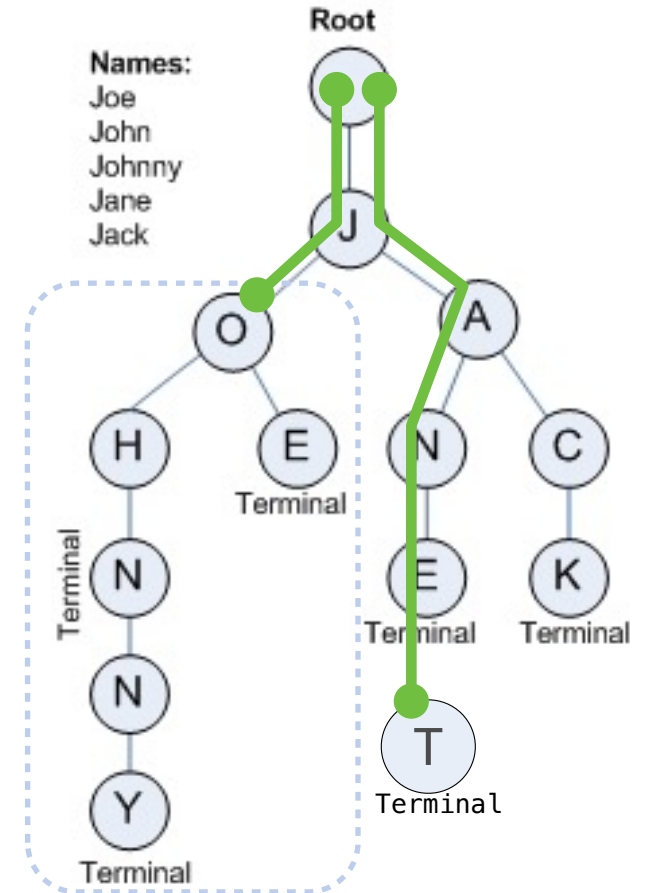
lookup: Follow a path from the root using a prefix, then enumerate everything below the resulting node

Example: "JO"

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

Example: "JANET"

(Demo)

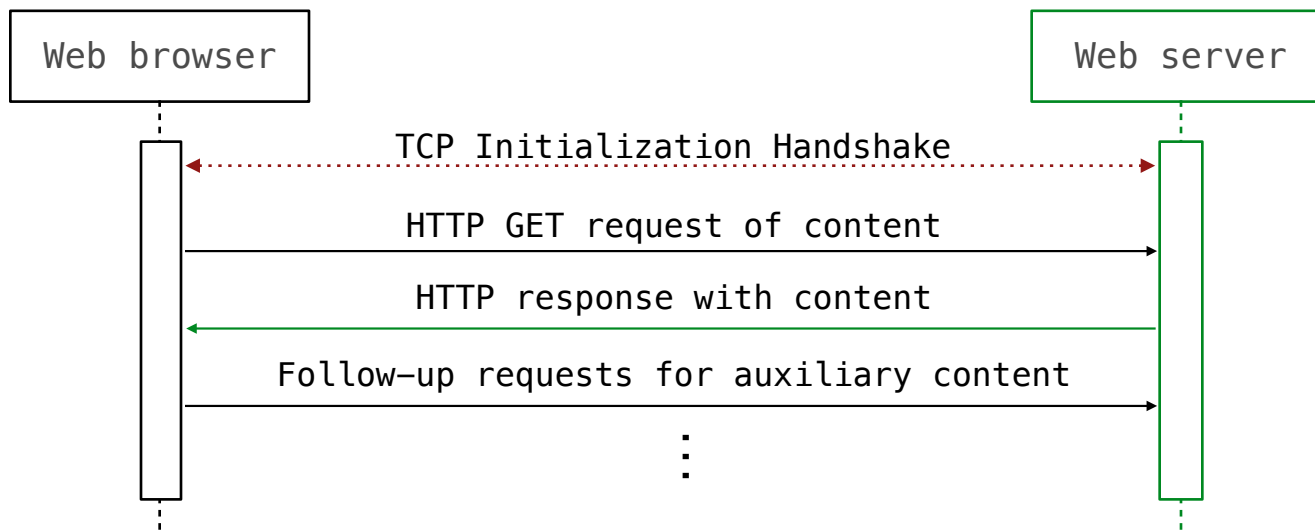


Flask

The Flask Web Framework

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

Manages data exchange between a browser and a Python program



(Demo)

Threads

Threads

A thread executes a function call

Multiple threads can execute different calls simultaneously

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

Thread(target=<function>, args=<args>): Create (but do not start) a thread of execution

.start(): Start the function call, but do not wait for it to complete

.join(): Wait for the function call to complete (return value is ignored)

.run(): Start the function call and wait for it to complete

(Demo)

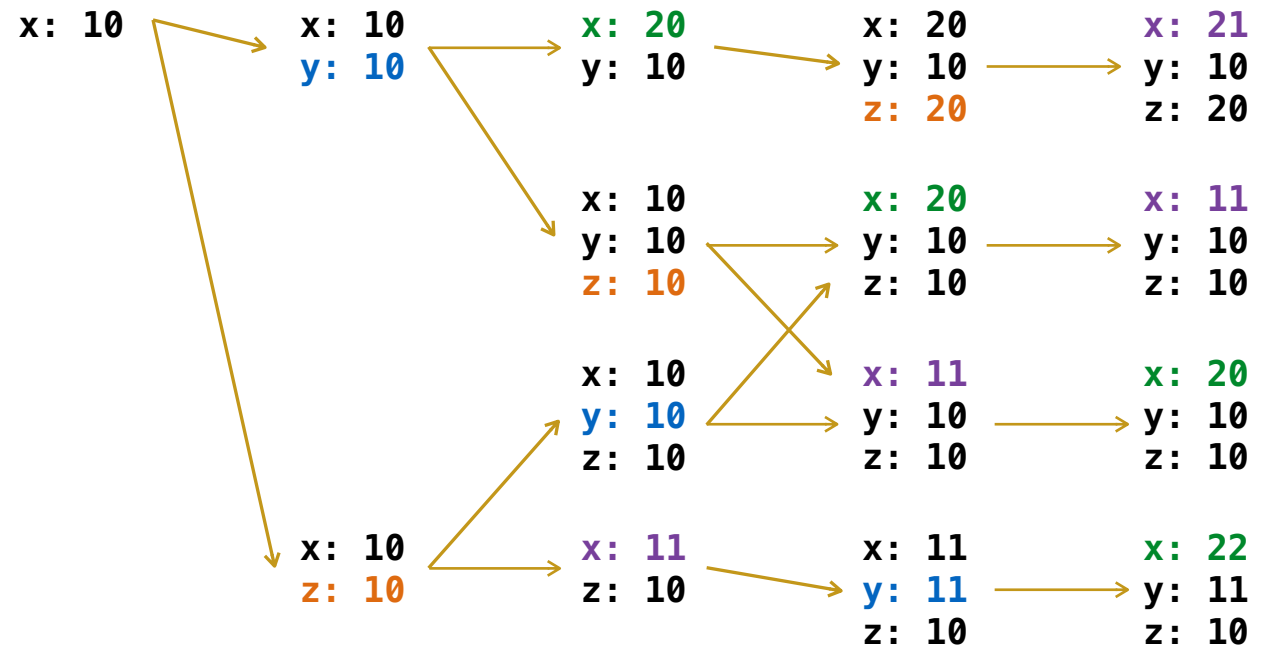
Shared State and Race Conditions

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

x = 10

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

```
do_something()  
z = x  
do_something()  
x = z + 1
```



Locks and Critical Sections

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

```
x = 10
s = Lock()

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

do_something()
s.acquire()
z = x
do_something()
x = z + 1
s.release()
```

