




Week: 9 Date: 10/28/2021

15-110 Recitation Week 9

Reminders

- Check4/HW4 Code Reviews are happening this weekend!
- Check 5 is due Monday, 11/01
- Check4/HW4 revision deadline is 11/02
- Quiz 4 is on Wednesday, 11/03

Overview

- Concurrency
- mapReduce
- Pipelining
- Internet Questions




Problems

CONCURRENCY:

Match the following examples to the corresponding level of concurrency.

Circuit-Level Concurrency	You have Zoom, Chrome, and Messages all open on your Mac at the same time. The scheduler decides Zoom gets the CPU at the current time being.
Multitasking	A computer calculates (4*5) // (2*2) in 2 time steps instead of 3
Multiprocessing	Everyone in 15-110 Lecture 1 is googling "Halloween parties near me" at the same time. Google routes these requests to different servers in one of their server farms.
Distributed Computing	Your computer has a processor chip with several cores. When you open Zoom, Google Chrome, and Pyzo at the same time the operating system assigns them to different cores.

Draw the concurrency tree for the following math equation:

(5 + 3) / (1 + 1) * ((36 / (10 - 4)) + (8 * 3)) – 9




What is the number of **total steps**?

What is the number of **time steps**?

MAPREDUCE

Recall the components of a mapReduce algorithm...

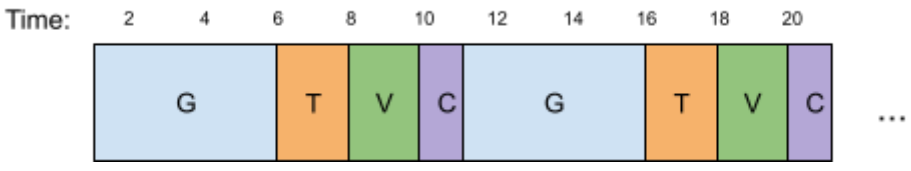
Suppose we make a mapReduce function to count the number of files that have an even number of occurrences of the string "Trick or Treat!". Define the mapper, reducer, and manager actions.

Mapper: Reducer: Manager

PIPELINING

You just started your summer job working at the best burger restaurant in the United States, In-N-Out! It's the daily 1 hour lunch rush and you are trying to figure out what the most efficient way of churning out burgers is. Preparing the burgers for customers takes 4 steps that must be performed in this order: grilling burgers takes 5 minutes (G), toasting buns takes 2 minutes (T), placing vegetables takes 2 minutes (V), and dressing condiments takes 1 minute (C). You start off by just making the burgers one after another.

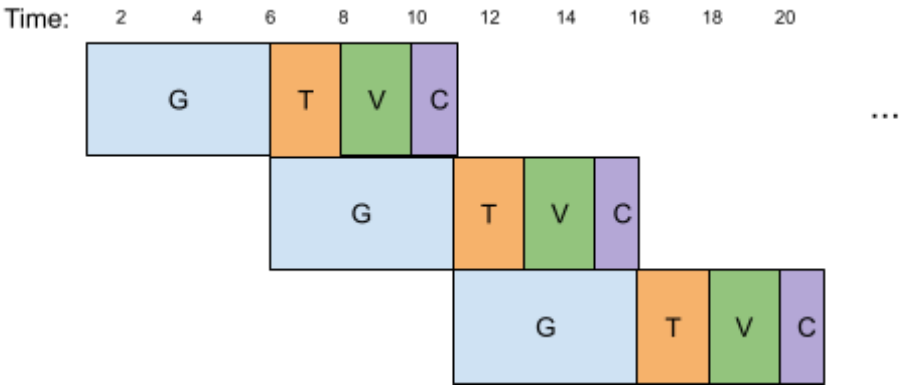
How many burgers can you fully complete in the 1 hour lunch rush? _____



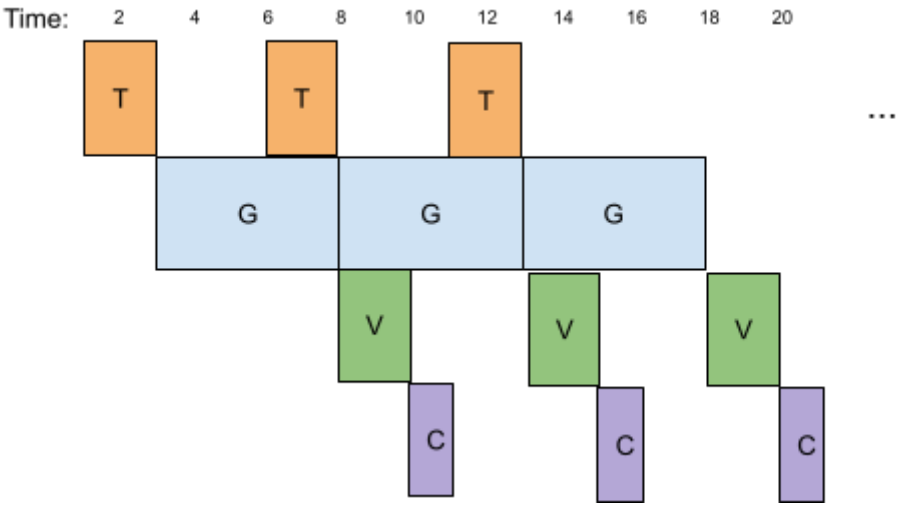



You and your friend just learned about pipelining in 15110 and your friend proposes the following pipelines to speed up burger production. Your friend asks you to check over the pipelines they made and see if there are any errors. For the following pipelines identify the error if there is one or say no error if there is none. (Assume you have as many workers and as much equipment as you need to build burgers)

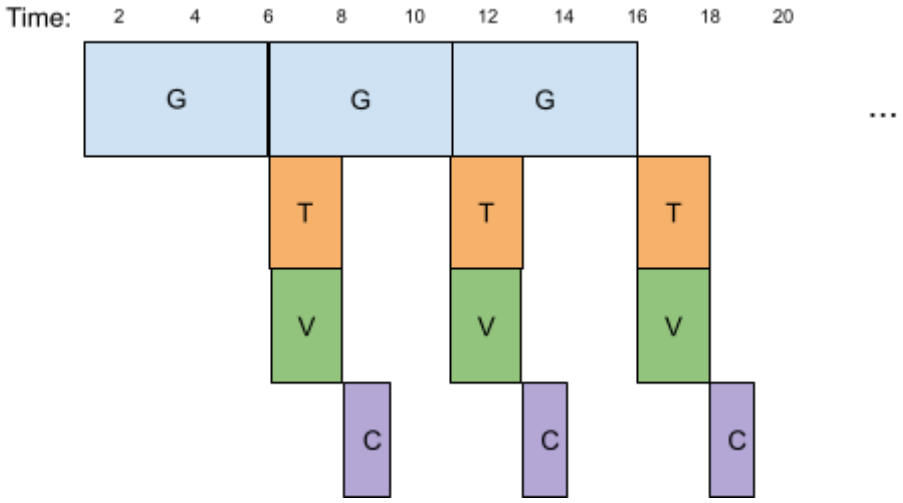
Option 1)



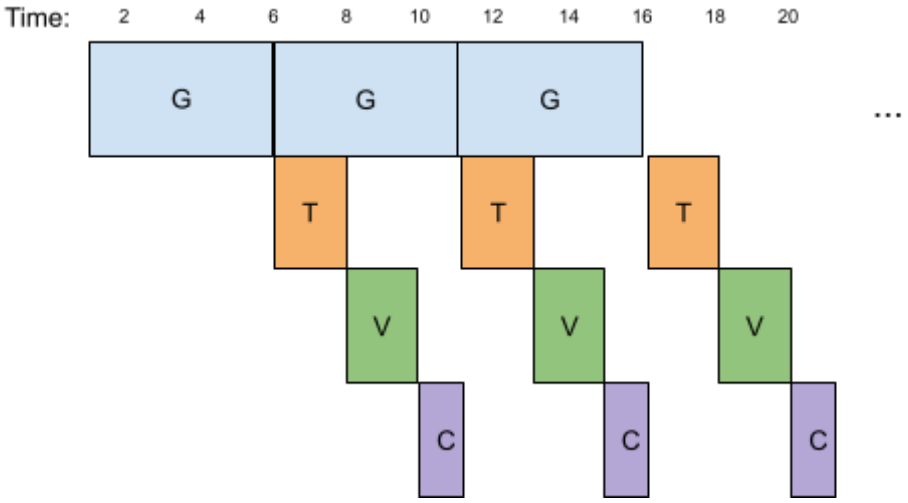
Option 2)



Option 3)



Option 4)






Using the correct pipelining strategy, how many burgers will you be able to make during the lunch rush?

With the correct pipelining strategy, how many workers do we need? With this number of workers, does pipelining allow for faster burger production? What are the tradeoffs?

Number of workers: Additional answers/notes:

QUICK INTERNET QUESTIONS

The internet is governed by a series of protocols, HTTPS is one of them. T/F

The net neutrality debate surrounds whether internet users should be able to create biased content and share it on public internet forums. T/F

IP addresses can be static or dynamic. T/F

All packets routed back to your computer from a website are guaranteed to be routed through the same wire. T/F

The internet is built such that if some components go down, it can continue operating with no interruption. T/F