Introductory Computer Science

Week 1 — Introduction: What is Computer Science? Also, Git

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Dedicated To Brandon

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Introduction

- The content from the material provided is for people with no prior programming experience.
- We will start with Python to not discourage anybody as it tends to be one of the more intro-friendly languages.
- However, the intent of this course is to learn Computer Science using Python and not necessarily the other way around.
- To reinforce this, we may go into Java (depending on progression).
- Feel free to ask questions.

Tentative itinerary

1. Introduction, Git
2. Primitive Types, Strings, Sets, Tuples, Functions Dictionaries, Lists, if-statements, Loops
3. File Reading, Memory Model, and Debugging
4. Recursion*
5. Recursion*
6. Object Oriented Programming*
7. Object Oriented Programming*
8. Design OR Data Structures*

I will try my best to cover topics to your interests
We may bleed into August
* = Not Certain

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What is Computer Science?

- Not a formal science
- Not necessarily about computers
- The study of algorithms and (virtual) data structures
- More a bit later...

Small overlook of fields in Computer Science

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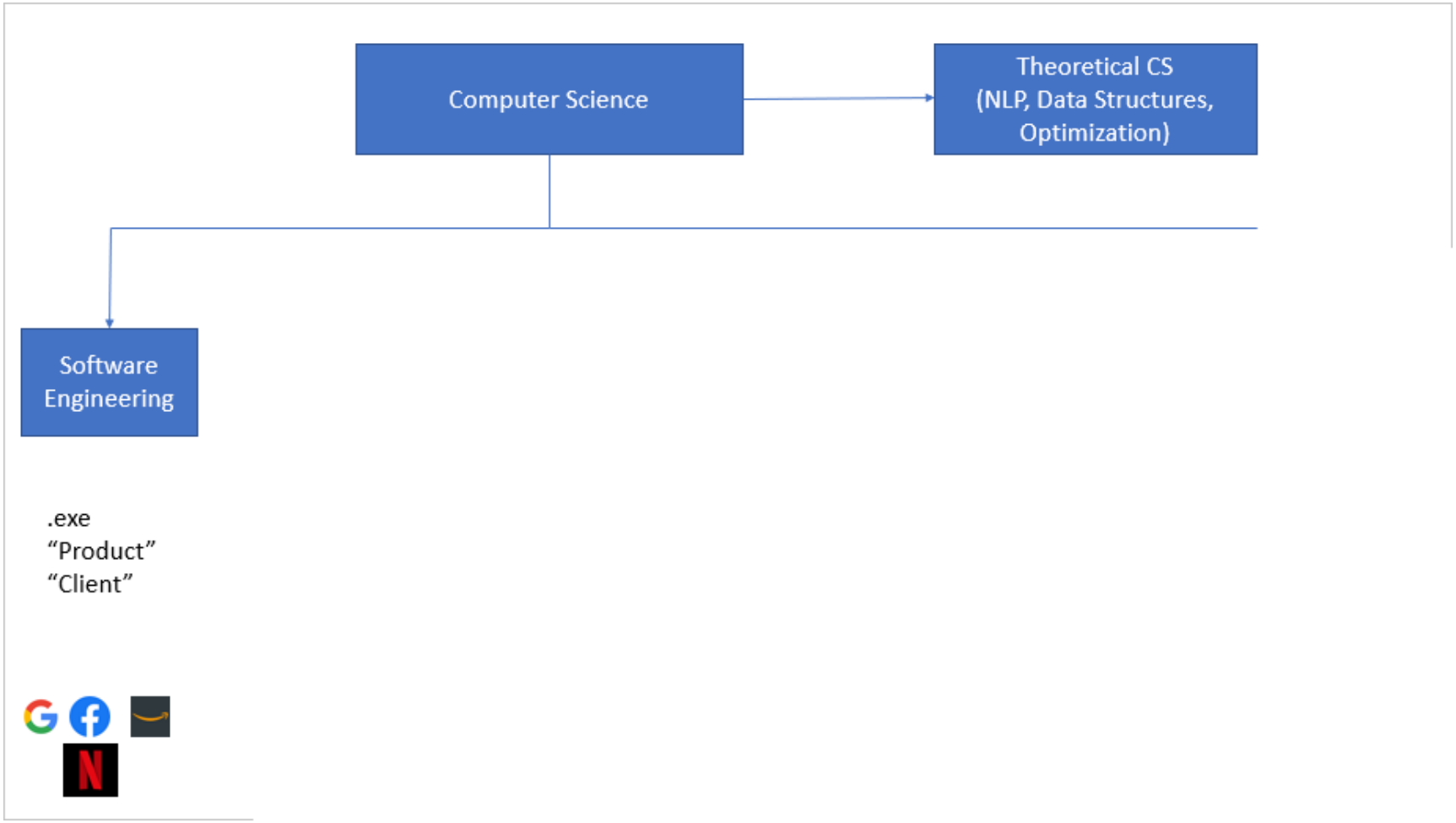

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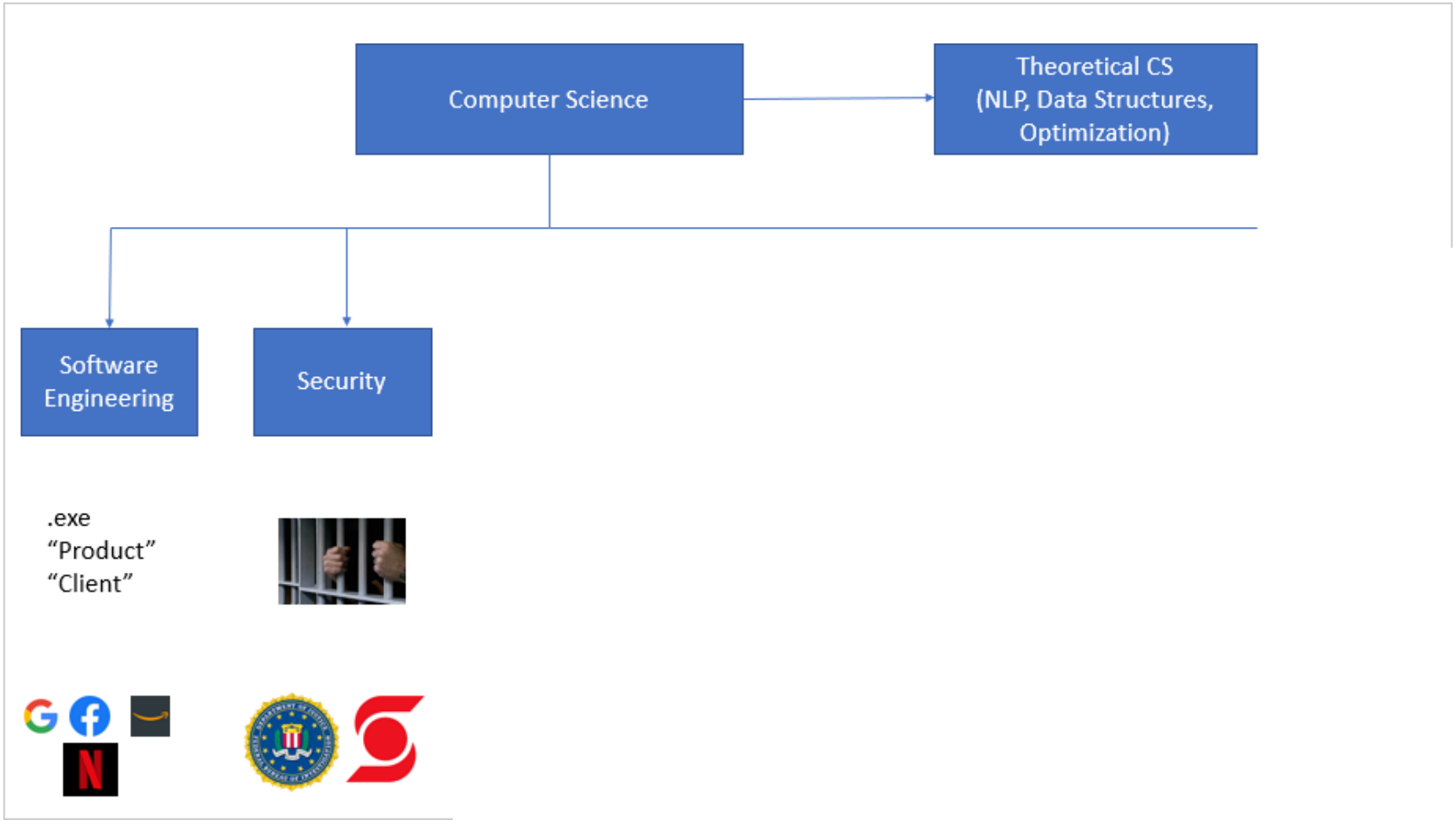

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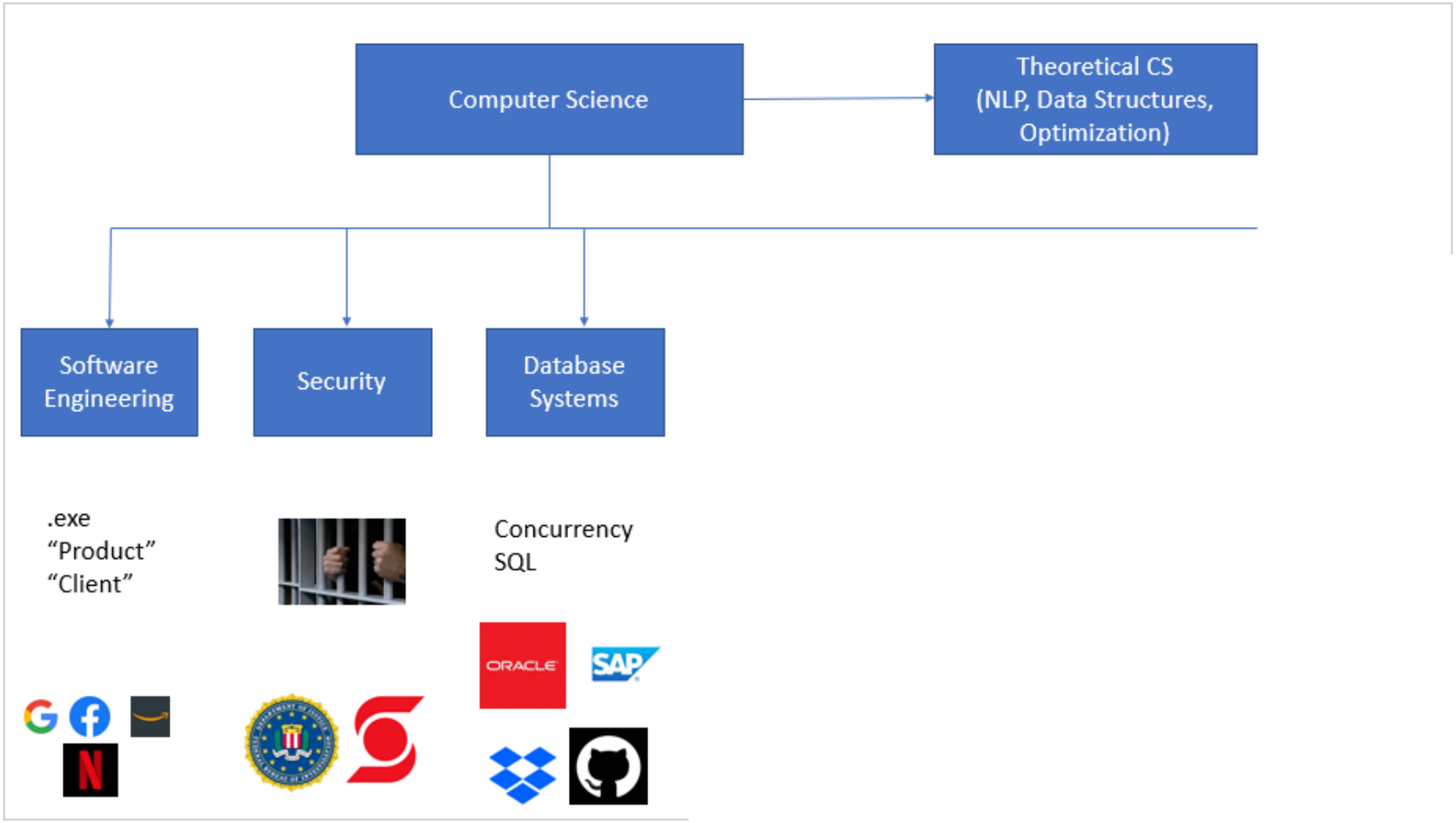

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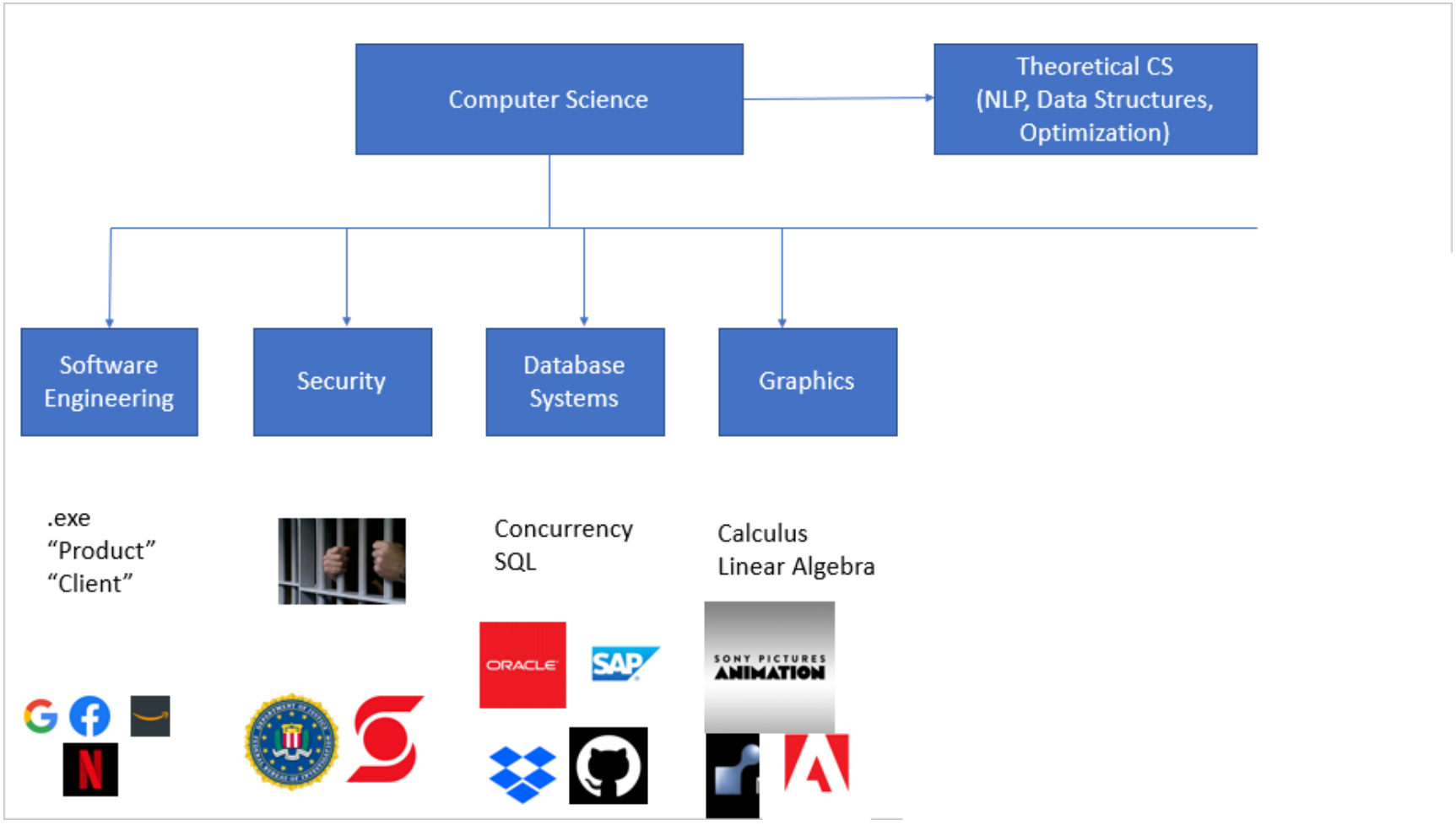

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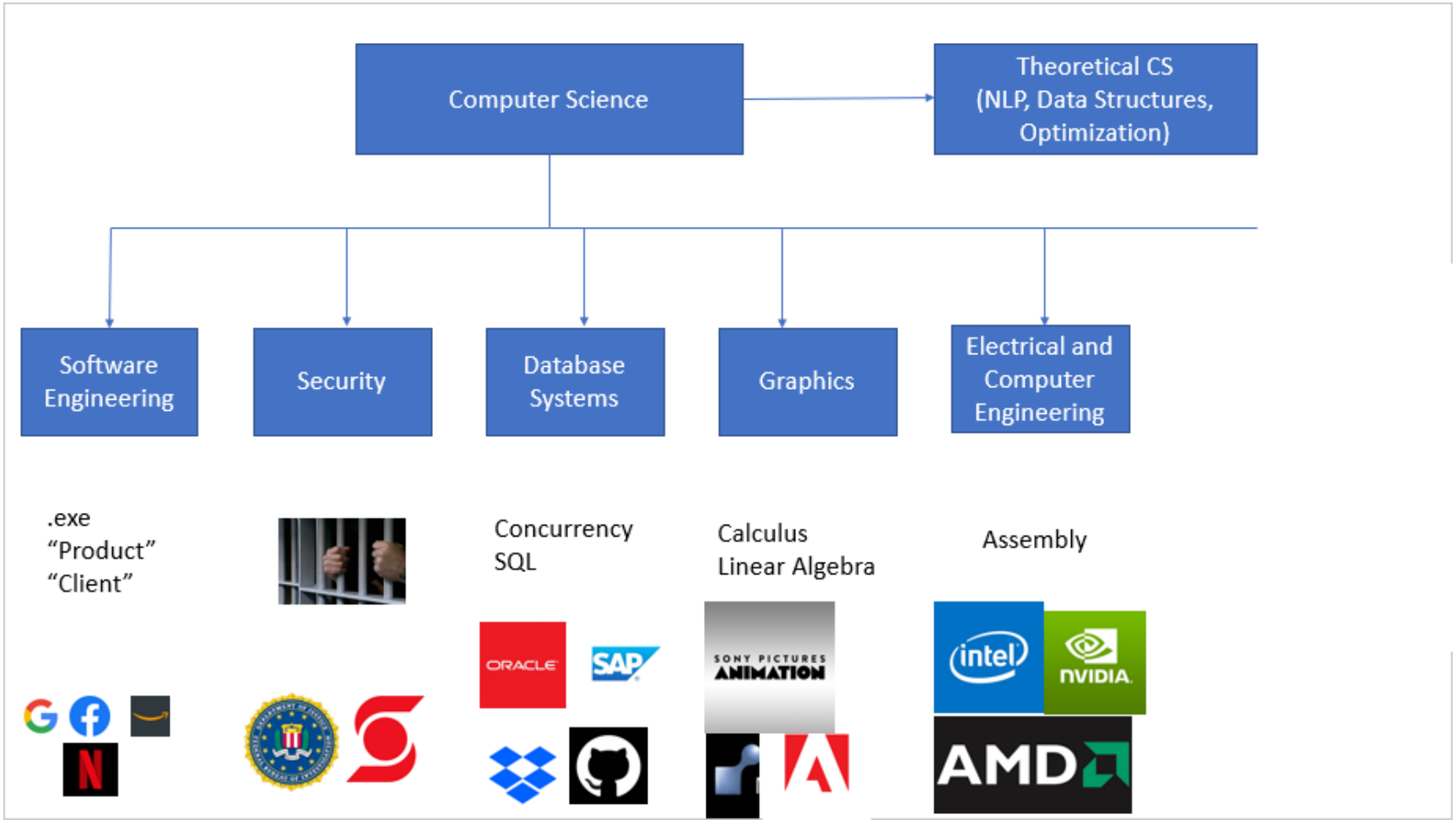

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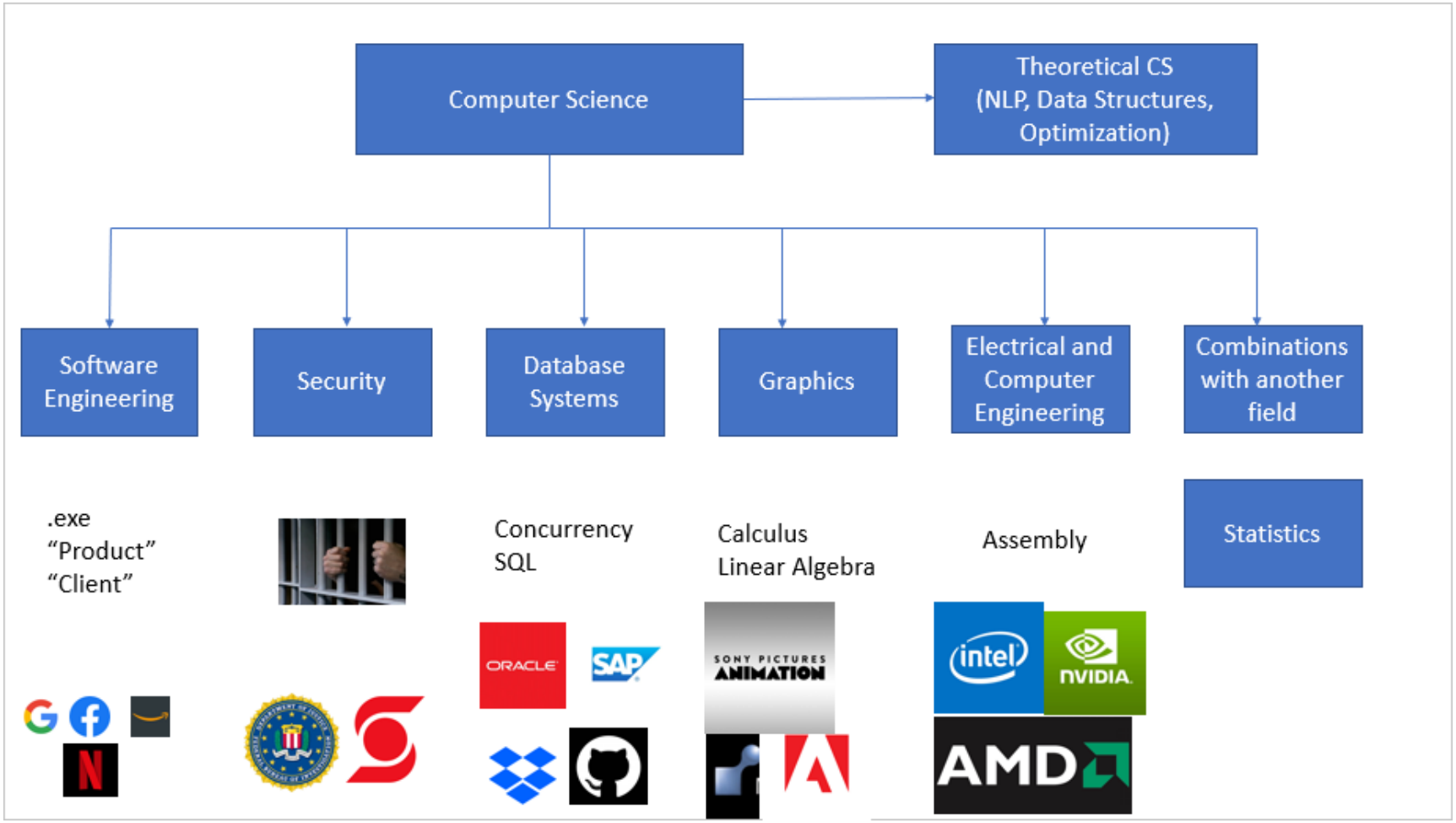

Sorry for the Tangents, let's get started!

Starter pack:

- Git
- GitHub
- Python
- Notepad ++

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Some UNIX commands

- `pwd` # Give me my current path
- `ls` # Show what is in my current path
- `cd some_dir` # Change directory
- `cd ..` # Change directory to parent path

Why Git?

- Typically the industry standard for version control
- If your computer crashes, you're capable of knowing where you left off in your progression
- Something to easily put on your CV
- What we are going to do our work on

Git: Getting ready

- `git clone <some_repository.git>` # Copy a repository to your current path
- `cd <some_repository>`
- `git status` # check status of your repository

Git: Staging files onto GitHub

- `git add file_1.txt`
- `git add file_1.txt file_2.txt` # adding multiple files by space
- `git add *` # add everything in the current path
- `git add *.txt` # add all text files in the current path

Git: Committing

Commits must have meaningful messages pertaining to what you did to your code. Particularly for any changes after you stage your files:

- `git commit -m "Believed completion of flargenschpoodle class"`

Git: Pushing

Put your changes onto GitHub

- `git push`

Vim

- A lightweight text editor
- Not initially “user friendly”
- Will be used to deal with conflicts (unless you configure it)

Vim: Getting in and out

- `vim file.txt`
- i = INSERT MODE
- <ESC> :wq = “write, then quit”

Conflicts: Prepending and Appending

- Open the `all/git_practice/practice_file.txt` file in Notepad++
- One person writes something above the existing written line, another person writes something below the existing written line
- Both commit and push

Conflicts: Realistic conflicts

- Update your local repository: `git pull`
- Open the `all/git_practice/practice_file.txt` file in Notepad++
- Both edit the existing line
- Both attempt to commit and push

Branching: Getting Started

Allows features to be worked on, on a modular level. Think of it as a timeline. Branching allows contributors of the repository to contribute without messing around with the live product

- `git branch <BRANCH NAME> # Create a branch`
- `git branch -a # View all branches`
- `git checkout <BRANCH NAME> # go to branch in the repository`
- `git push --set-upstream origin <BRANCH NAME> # put the branch onto GitHub`

Branching: Merging

All commits are not recorded until you merge it into the master branch. However, a dev-branch is made so that no errors occur on the live product

- `[dev-branch] $ git merge <YOUR BRANCH NAME> # Vim may pop up, and may ask you to clean any conflicts`
- `[dev-branch] $ git checkout master`
- `[master] $ git merge dev-branch`

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Going back... What is Computer Science?

- Not a formal science
- Not necessarily about computers
- The study of algorithms and data structures

What is an Algorithm?

- A set of instructions
- Broken up atomically
- Put together in sequential order

Algorithms

Think of Algorithms analogously to...

- Cooking Recipes
- GPS directions

Machines Are...

- Used to automate repetitive tasks that can make a person insane
- They can follow simple directions
- Can only follow specific instructions, not necessarily what Siri or Alexa could do
- Example: "Get dressed"
- "First put on your undies. Okay Second, put on your under shirt. Okay third, put on your pants. Okay, and finally, put on your shirt"
- Computer Science can be thought of turning low granular ideas (that tend to be ambiguous) into high granularity algorithms (which tends to be straight-forward)

General Theme in Computer Science

- You will be given many problems that seem to be large and overwhelming
- However, an objective skill to develop is to break down the problem into smaller parts
- Making it easy for yourself to understand

Now, if time permits, let's get started on Python!