Computer Programming Fundamentals

CS 152
Professor: Leah Buechley
TAs: Melody Horn, Noah Garcia, Andrew Geyko, Juan Ormaza
Time: MWF 10:00-10:50am
https://handandmachine.cs.unm.edu/classes/CS152_Fall2021/

WEBSITE

https://handandmachine.cs.unm.edu/classes/CS152_Fall2021

Syllabus

Schedule
with class slides, assignments, etc.

Policies

Links to other material

USE PIAZZA FOR QUESTIONS DURING LECTURE

- We'll use the live chat feature
- Post questions or issues you're having
- Up vote and down vote other posts
- I will check in periodically during lecture
- Also feel free to raise your hand
- Please don't interrupt and wait until you are called on to ask a question.

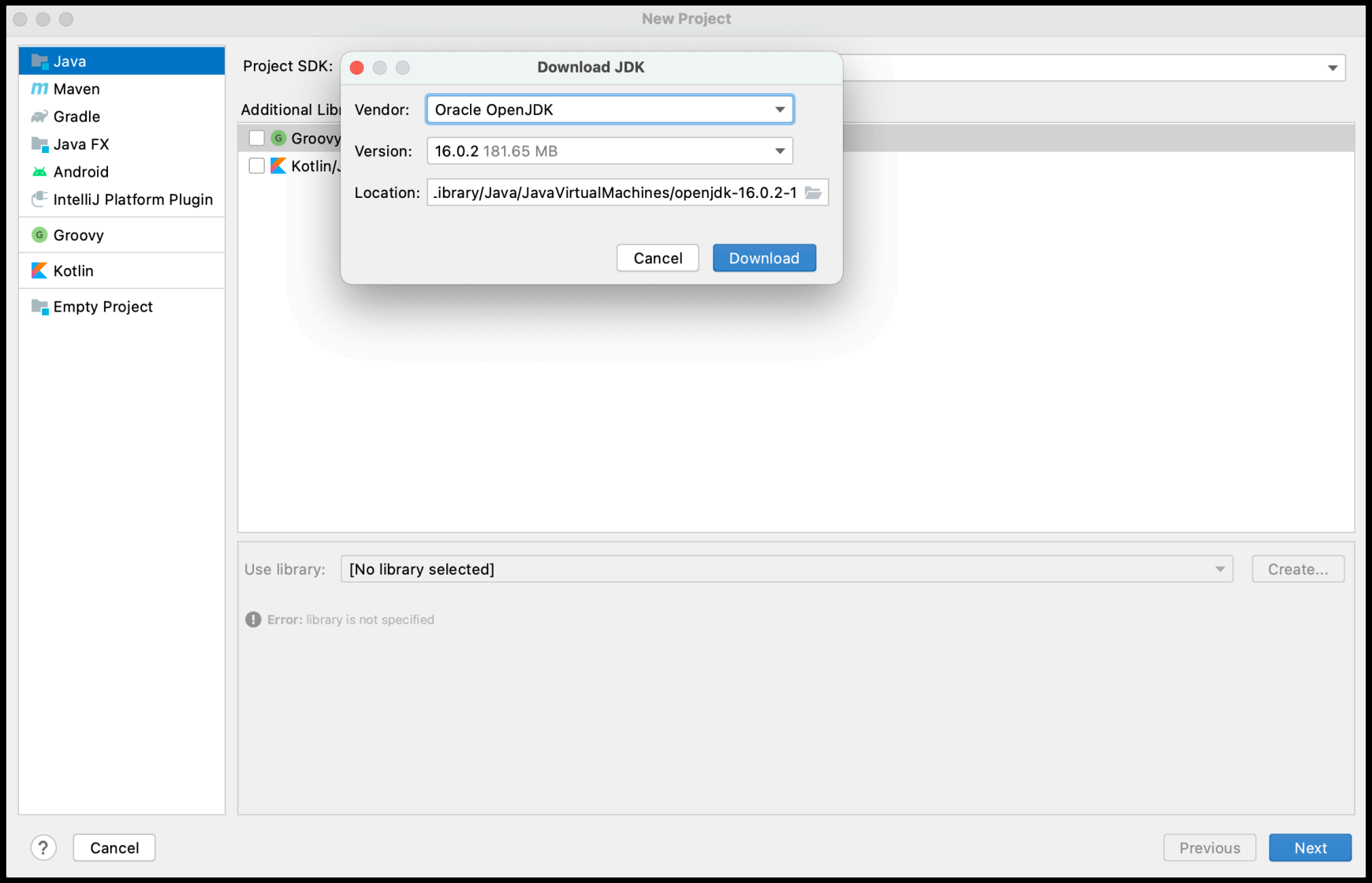
ASSIGNMENT 1

- Due Monday 8/30 by 9:30am
- Essay: What Excites you about Computing?
- Include an example of a person or project that you find inspiring.
- Submit via UNM Learn

questions?

IntelliJ INSTALLATION

1. Open IntelliJ
2. Choose “New Project”
3. Under Project SDK choose “Download JDK”
   SDK = Software Development Kit
   JDK = Java Development Kit
4. Choose “OpenJDK”
5. Choose “Java version 16.0.2”

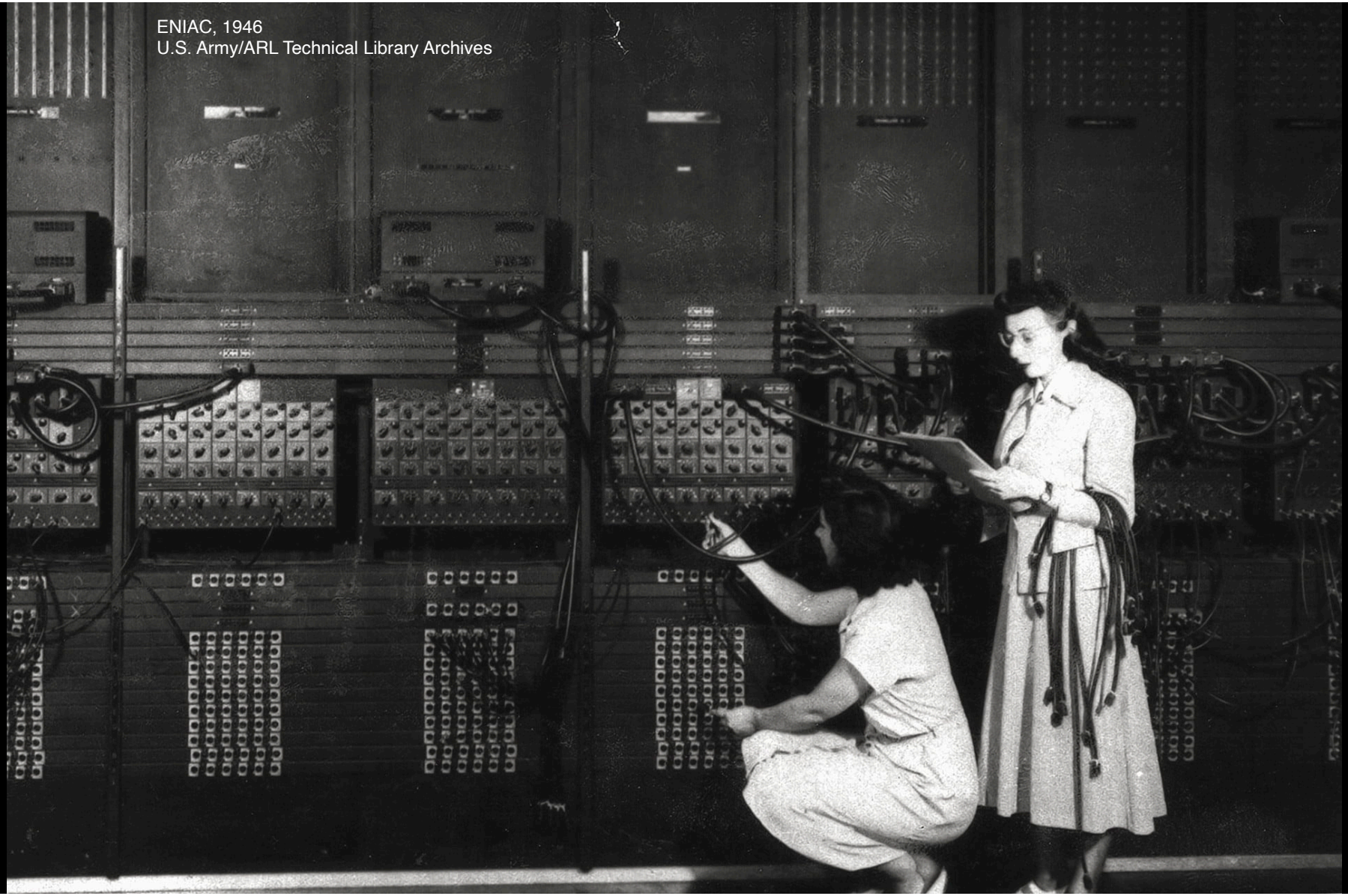

New Project
Java
Maven
Gradle
Java FX
Android
IntelliJ Platform Plugin
Groovy
Kotlin
Empty Project
Project SDK:
Additional Libr
Groovy
Kotlin/J
Download JDK
Vendor:
Oracle OpenJDK
Version:
16.0.2 181.65 MB
Location:
.ibrary/Java/JavaVirtualMachines/openjdk-16.0.2-1
Cancel
Download
Use library:
[No library selected]
Create...
Error: library is not specified
Cancel
Previous
Next

questions?

let that download

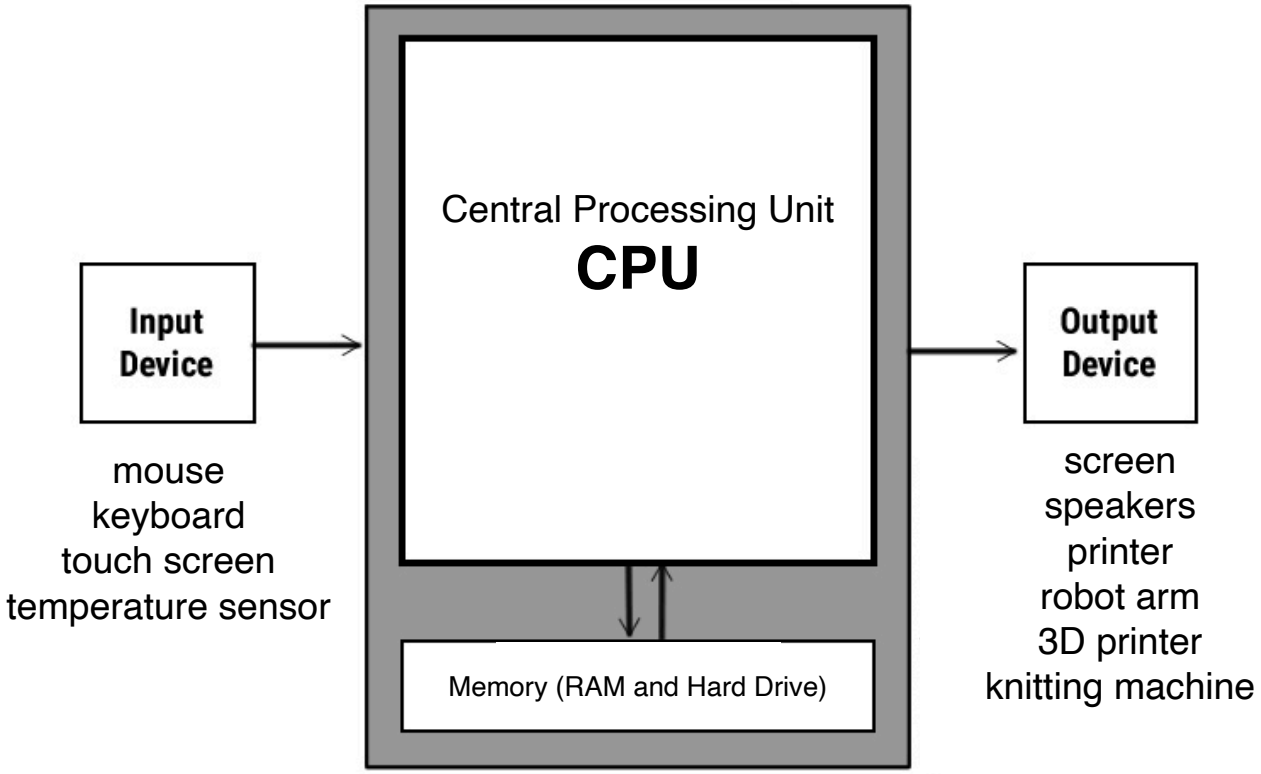
COMPUTING

WHAT IS A COMPUTER?



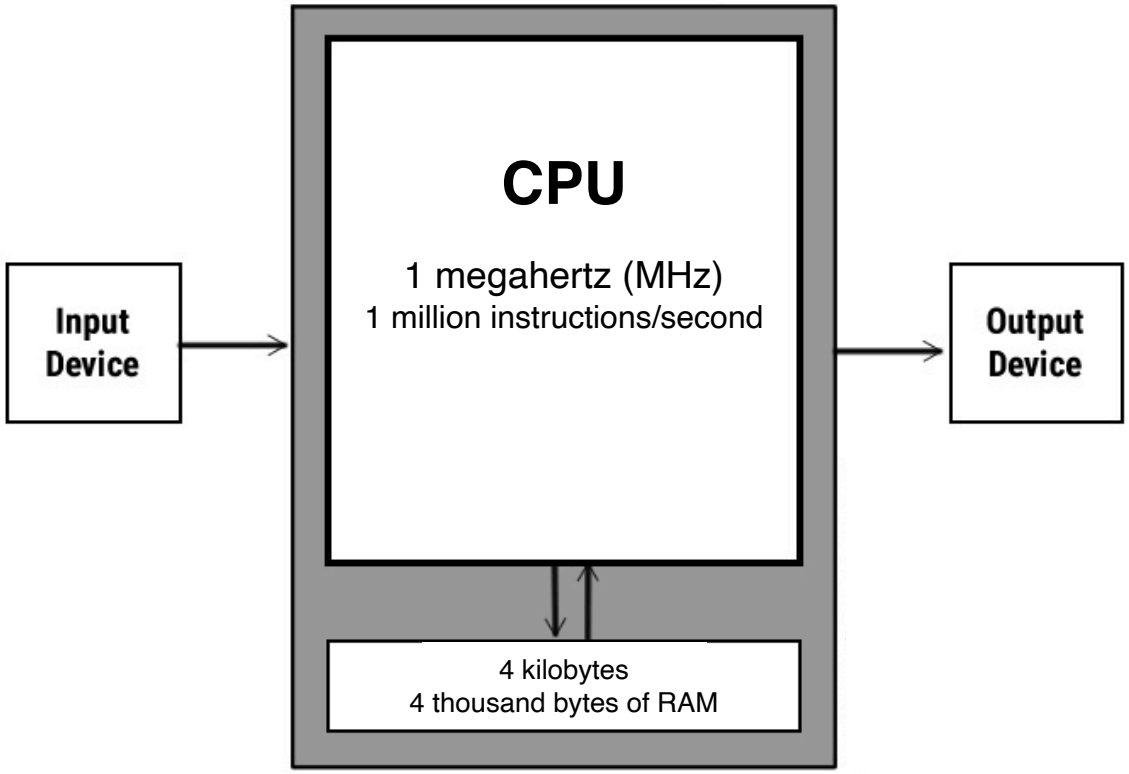
ENIAC, 1946
U.S. Army/ARL Technical Library Archives

BASIC ELEMENTS



APPLE II 1977

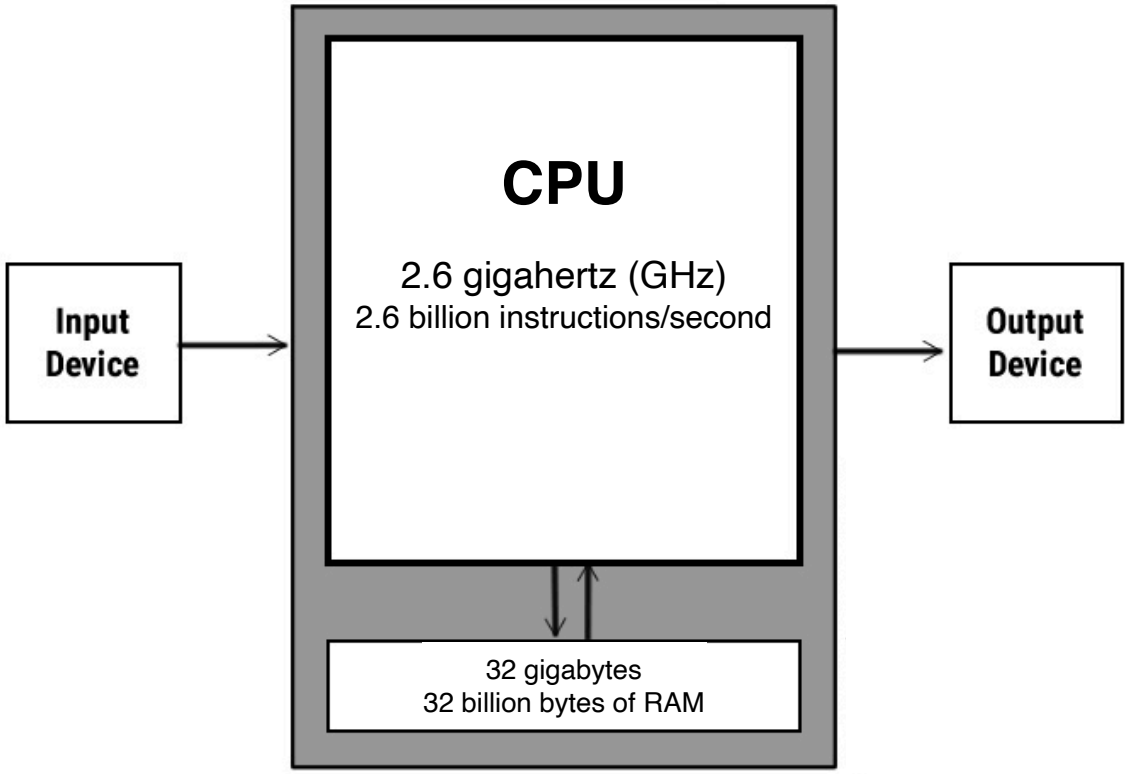
APPLE II 1977



MACBOOK PRO


MacBook Pro
esc
delete
tab
caps lock
return
shift
shift
fn
control
option
command
command
option

MACBOOK PRO

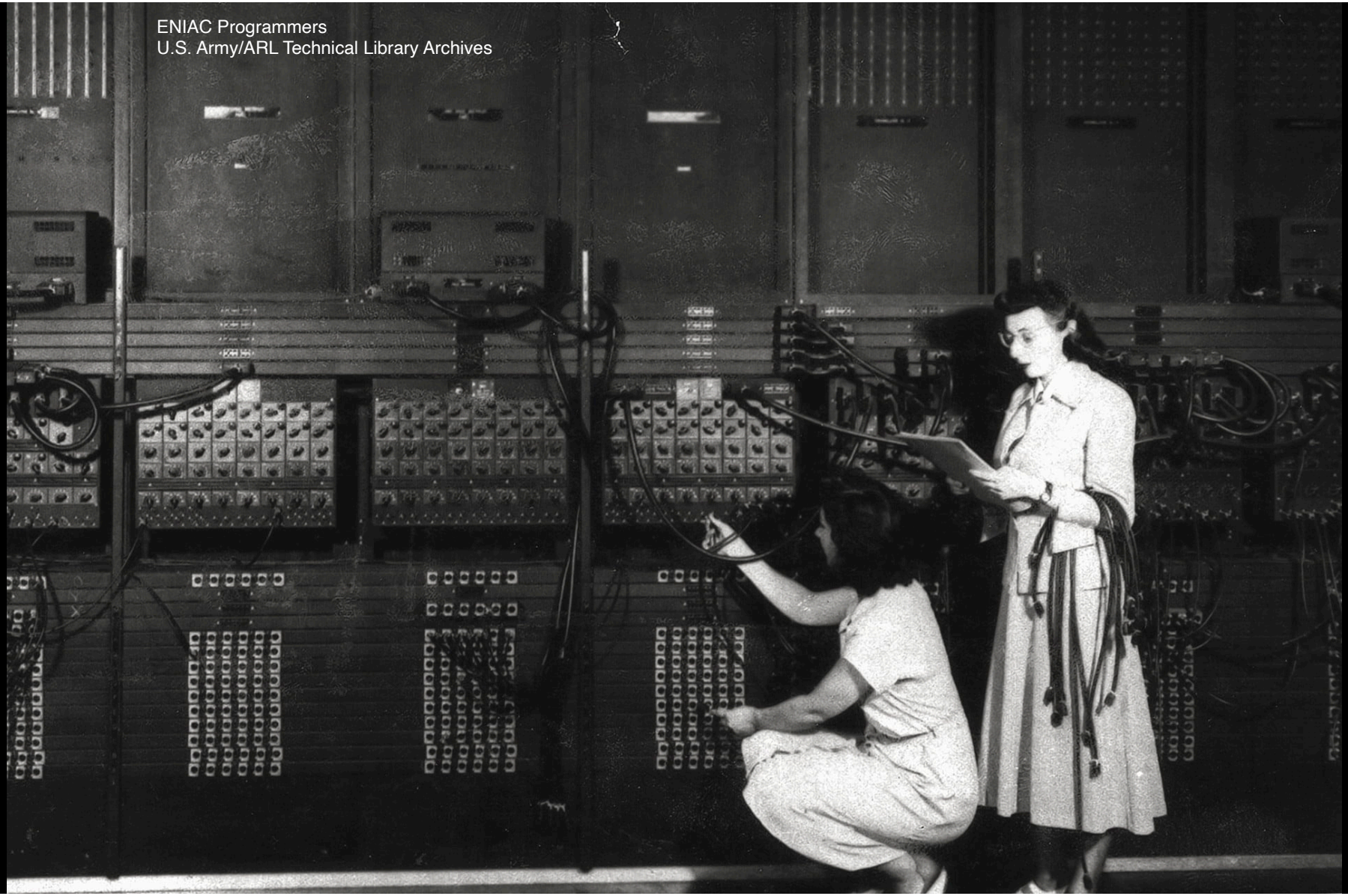

CPU
2.6 gigahertz (GHz)
2.6 billion instructions/second
Input Device
Output Device
32 gigabytes
32 billion bytes of RAM

A PROGRAM

A set of instructions that tells the computer what you want it to do.

A PROGRAMMING LANGUAGE

How you tell the computer what you want it to do.



ENIAC Programmers
U.S. Army/ARL Technical Library Archives

ENIAC PROGRAMMERS

- Kay McNulty
- Betty Jennings
- Betty Snyder
- Marlyn Wescoff
- Fran Bilas
- Ruth Lichterman
- Programmed the computer by rewiring it
- Not acknowledged or recognized until 1980s
- Went on to co-design the first programming languages and the next generation of computers

PUNCH CARDS


HELLO, WORLD. THIS IS TWO-BIT HISTORY. ABCDEFGHIJKLMNOPQRSTUVWXYZ 123456 !$&%#@*
MASS:WERK DATA CENTER <masswerk.at>
CDL 0815

LOW LEVEL PROGRAMMING LANGUAGE
ASSEMBLY

- Directly control the CPU and RAM
- Perform only low level operations, ie:
  - Move bytes from one place to another
  - Compare 2 bytes

ASSEMBLY CODE EXAMPLE

```
LDS     R16,0x01
STS     0x01,R2
add     R24,R22
```

HIGH LEVEL PROGRAMMING LANGUAGES

- Easier for humans to read and write
- More like natural language
- Higher level operations, ie:
  - Compute a square root
  - Draw to a screen

HIGH LEVEL PROGRAMMING LANGUAGES

Language	Date created
FORTRAN	1957
LISP	1958
BASIC	1964
LOGO	1967
C	1972
SmallTalk	1972
C++	1983
Python	1991
Java	1995
JavaScript	1996
Scratch	2006

HIGH LEVEL PROGRAMMING LANGUAGES

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JAVA

- First released in 1995
- Developed by James Gosling and partners at Sun Microsystems
- Now part of Oracle
- Object Oriented Language
- Code can run anywhere: Java Virtual Machine
- Similar to C and C++, but safer
- Garbage collection
- Now open source (as of 2007)
- Popular and widely used (Minecraft)

A DEVELOPMENT ENVIRONMENT

The software you use to write code.

IntelliJ

- IDE = Integrated Development Environment
- Written in Java!
- A place to write code
- A place to run code
- A place to debug code
- Knows the Java language and helps you write programs: autocompletion, built in links, etc.

OTHER WAYS TO WRITE JAVA

- Any basic text editor
- Replit: a web-based IDE
- Other IDEs
  - Eclipse
  - NetBeans
  - Microsoft Visual Studio

THE PROGRAMMING PROCESS

PROGRAMMING PROCESS

1. Write “source” code
2. Compile code
   - Compiler translates code written in high level language into “byte” code that a computer understands
   - Code with “syntax” errors will not compile
   - Syntax error = programming version of spelling and punctuation mistakes
3. Execute code
   - Computer runs or “executes” byte code
   - Turns written instructions into behavior!

questions?

LET’S START PLAYING

CHOOSE A LOCATION FOR YOUR JAVA CODE

- Choose a location on your computer where you will save all of your Java code for this class
- Create a folder in that location. Name it something appropriate. ie: CS152Java

BACK TO IntelliJ

IF YOU'RE ON A CHROMEBOOK or IPAD OPEN UP REPLIT

SETTING UP YOUR FIRST PROJECT

DON’T JUMP AHEAD

The next steps are important to get just right.

They’re easy to mess up.

Be patient :)

DON’T JUMP AHEAD

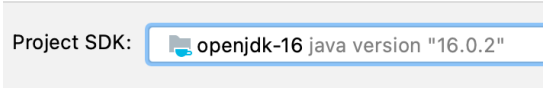
IntelliJ does a lot behind the scene

Creates a lot of files and folders

The project structure can get messed up

IntelliJ PROJECT SETUP

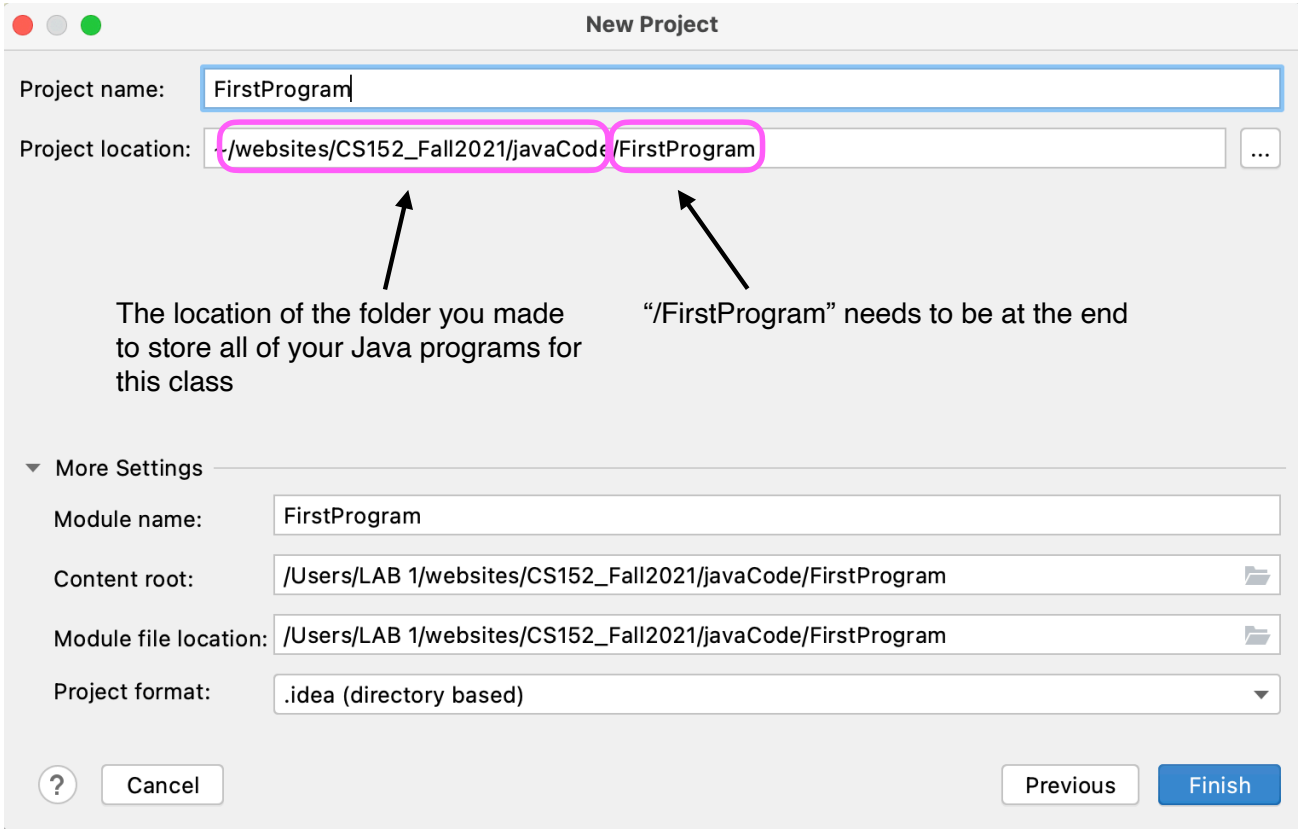
1. Select your newly downloaded SDK
2. Click “Next”
3. Click “Next”



IntelliJ PROJECT SETUP

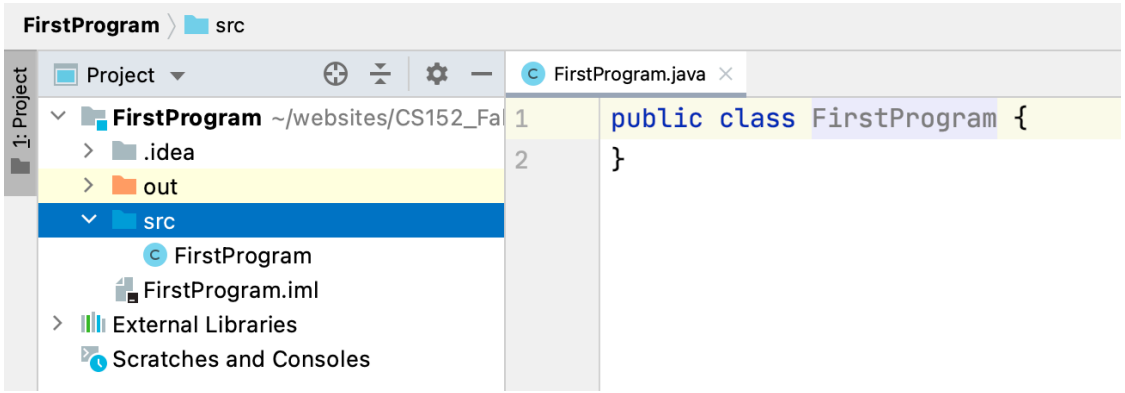
1. Type “FirstProgram” for your project name
2. Under Project location, browse to the folder that you just created. Again, this is where you’ll store all your Java programs. Select this folder.
3. IMPORTANT: Make sure “/FirstProgram” is at the end of the text you see in Project location. Add this text if it isn’t there. This creates a folder for your new project called FirstProgram.

IntelliJ PROJECT SETUP



CREATE A NEW FILE

- Create a new Java Class file in the src directory. directory = folder, src = “source code”
- Name it “FirstProgram.java”
- This will generate the basic code structure (see below)



JAVA PROGRAMS

- Class name “FirstProgram” must match file name “FirstProgram.java”
- Class name should start with capital letter
- If name is more than 2 words, all words are capitalized. No spaces. “FirstProgram”, “GreenApple”, etc.