

Tinker Academy

AP Computer Science Prep (Java Programming)
Lecture 1 - Java Fundamentals 2
(Virtual Memory)

Virtual Memory

Lecture 1 - Java Fundamentals 2

Java Runtime Environment

Java Virtual Machine (JVM)

Class Loader

Memory Manager

Bytecode Interpreter

Virtual Memory

Machine specific Libraries
(Native Libraries)



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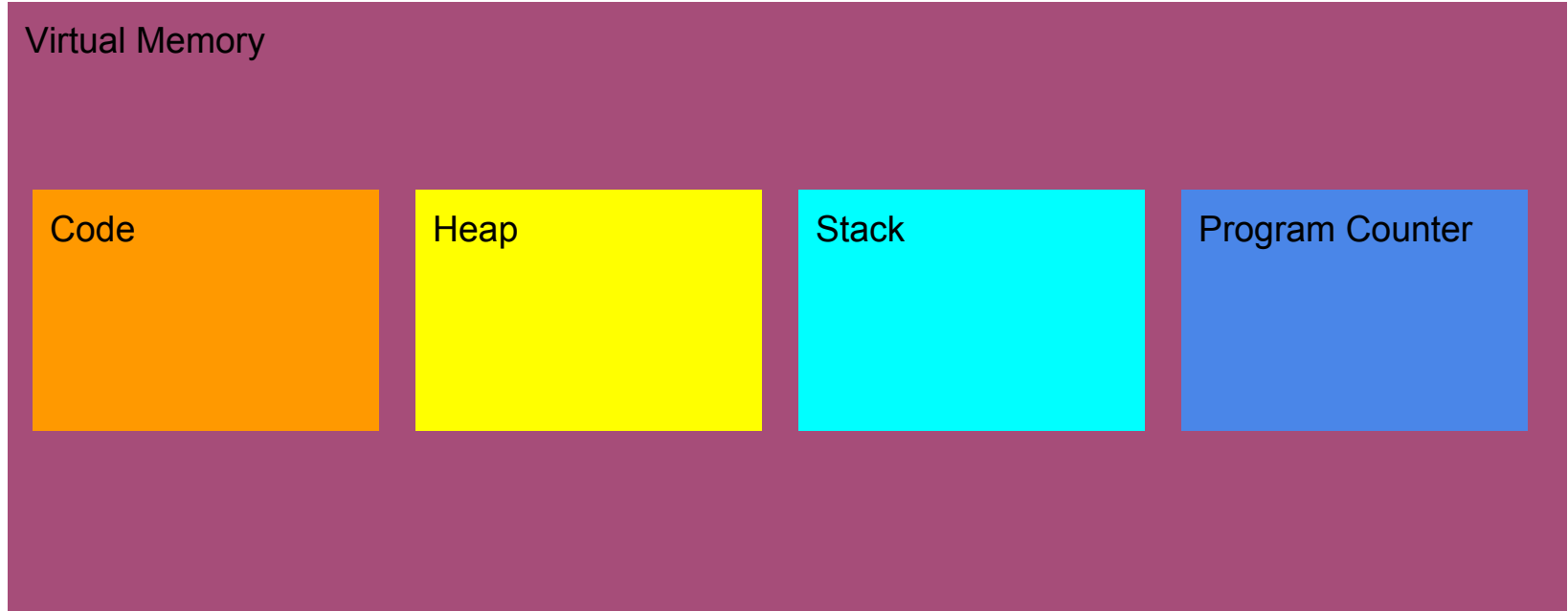
Virtual Memory

Code

Heap

Stack

Program Counter



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When a Virtual Machine runs it needs to store

- details of the classes it reads from class files
- objects that get created
- intermediate results of computation
- the next instruction to execute

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Program Data

- Stored in the Code area of Virtual Memory

Objects

- Stored in the Heap area of Virtual Memory

Intermediate Results

- Stored in the Stack Area of Virtual Memory

Next Instruction

- Stored in the Program Counter of Virtual Memory

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Storage needs to be

- **Efficient**
 - data should occupy optimal memory, nothing more
 - programs should be able to reference data easily
- **Precise**
 - the value of π should be stored as precise as possible
- **Fast**
 - simple computations should be blazingly fast
 - object creation should be as fast as possible

Virtual Memory Locations

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0x00A0 'H'	0x00A1 'e'	0x00A2 'l'	0x00A3 'l'
0x00A4 'o'	0x00A5 ' '	0x00A6 'W'	0x00A7 'o'
0x00A8 'r'	0x00A9 'l'	0x00AA 'l'	0x00AB 'd'
0x00AC '\0'	0x00AD	0x00AE	0x00AF

* UTF-8 encoding

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Virtual Memory Locations

- Memory is divided into locations
- Each location has a fixed size (8 bits)
- Each location has a fixed address
- Data is stored in memory locations
- Virtual Memory locations are contiguous
- Data is divided into components and each component stored in adjacent memory loc