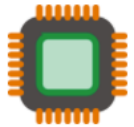


CASPER

CS305: Computer Architecture

Introduction

https://www.cse.iitb.ac.in/~biswa/courses/CS305/main.html

https://www.cse.iitb.ac.in/~biswa/

Computer

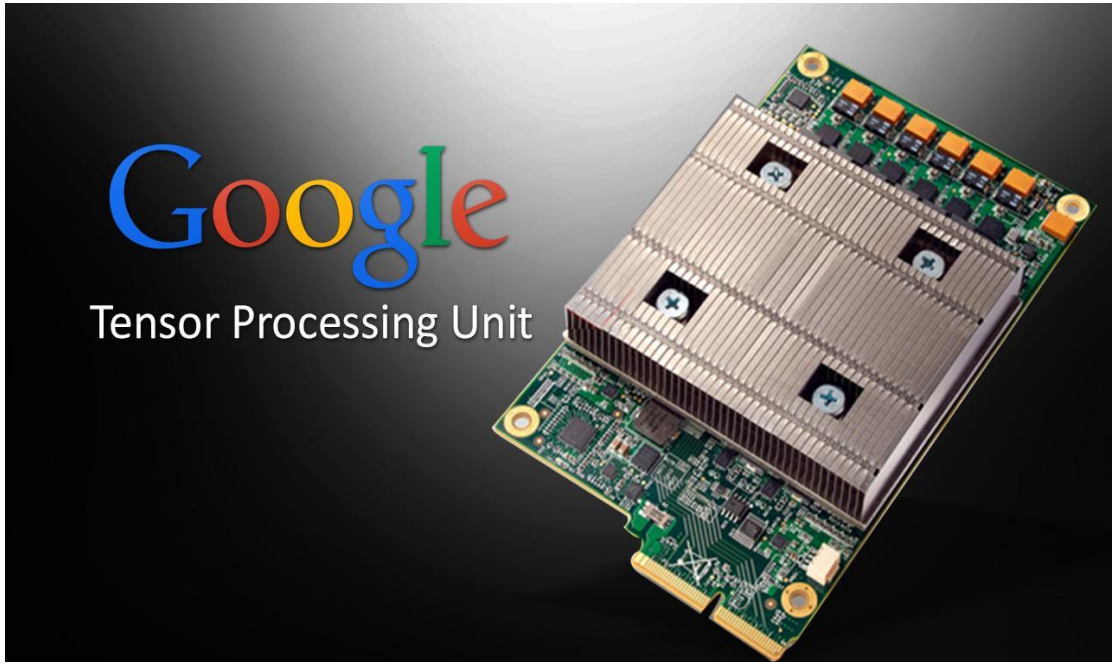
Architecture

Computer Architecture

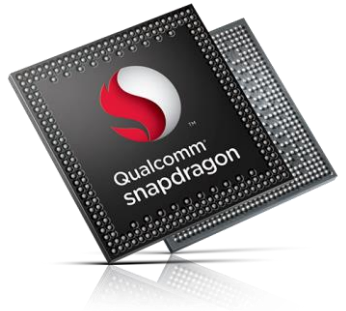
Let’s delay it to the last lecture (November 2021) ☺

Let’s have our own definitions

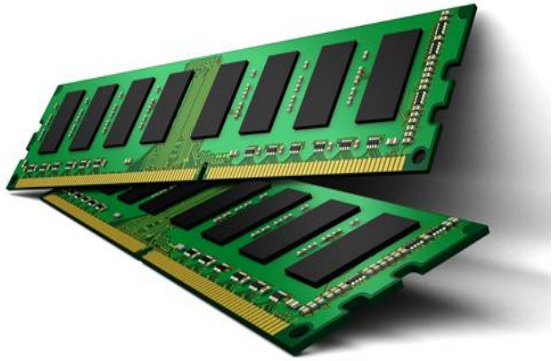
CS305+CS341


Google
Tensor Processing Unit


intel
Core™ i7


Qualcomm
snapdragon

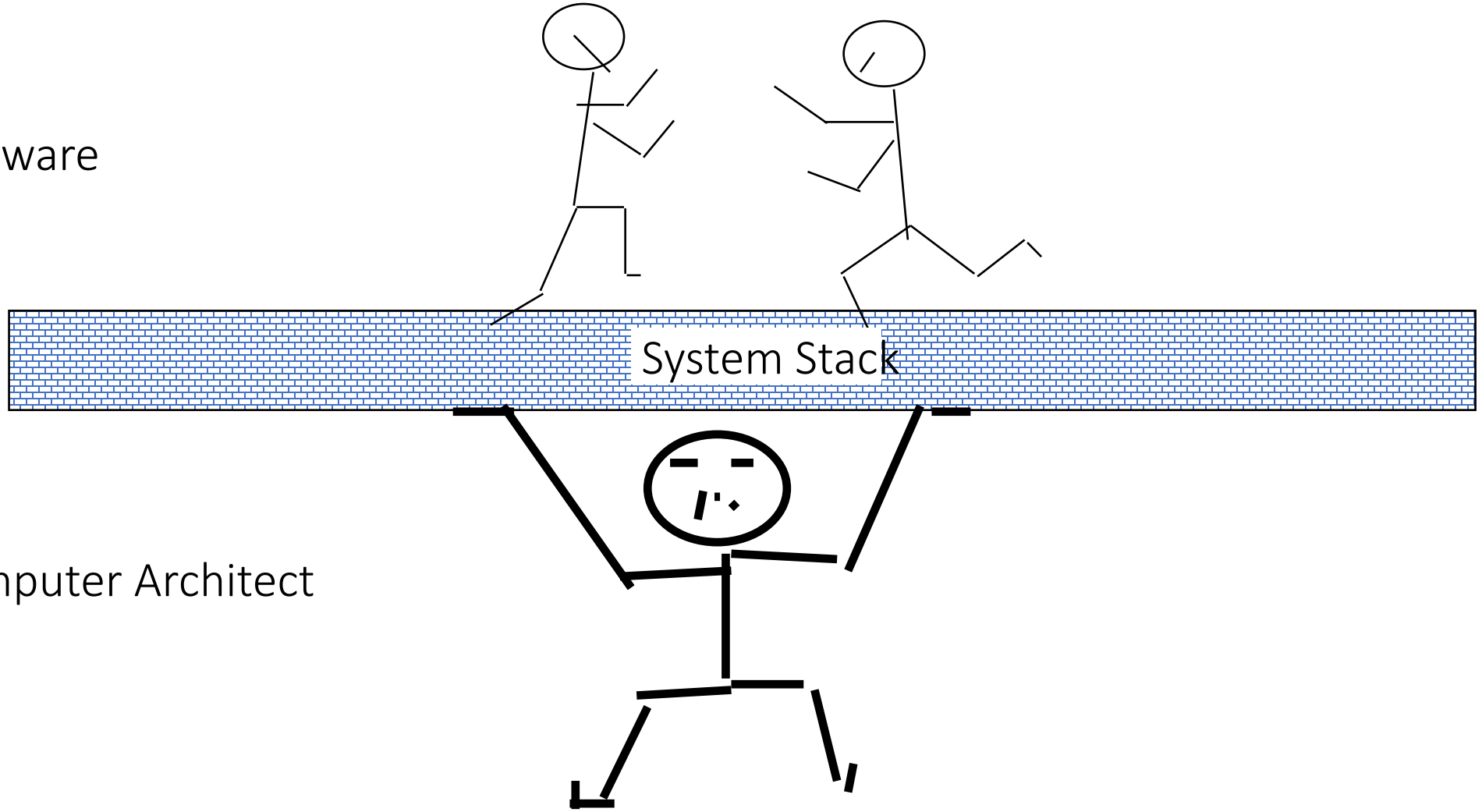

intel
Xeon® 5500



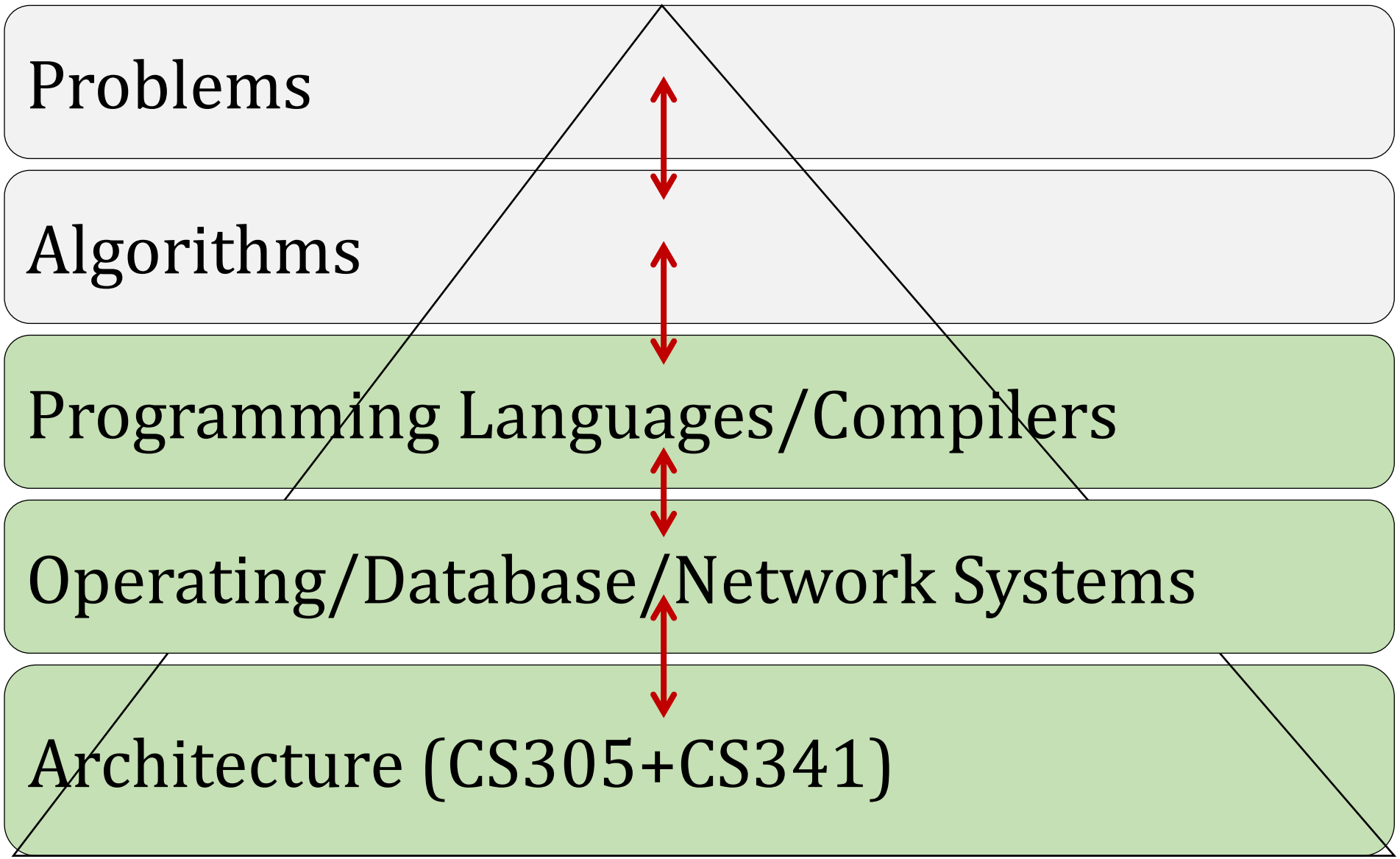

Titan X
GTX 980
Tesla M40
Tesla K80

Heavy Lifting

Software



Computer Architect



Computing Stack

All THE major Software Companies are now …

https://www.ai-startups.org/top/hardware/

NEWS > COMPANY NEWS

Facebook Is Reportedly Building its Own Chip

November 17, 2020

Meet the Microsoft Pluton processor – The security chip designed for the future of Windows PCs

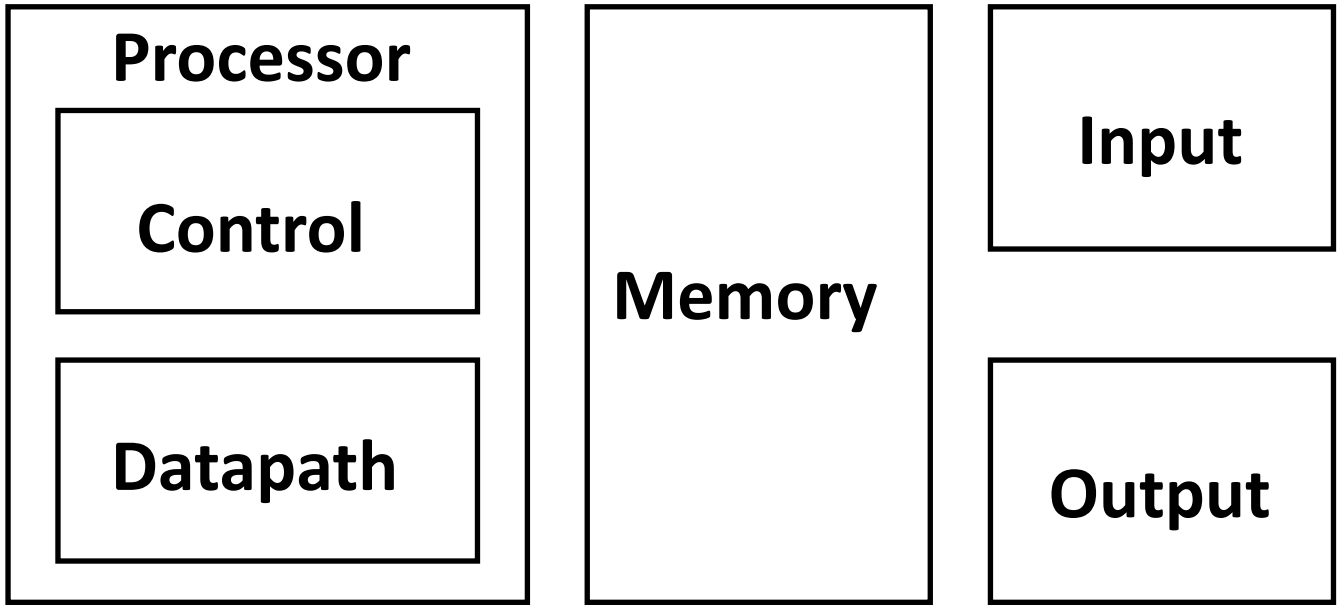
GOOGLE MOBILE TECH

Google is reportedly building its own processor for Pixels and Chromebooks

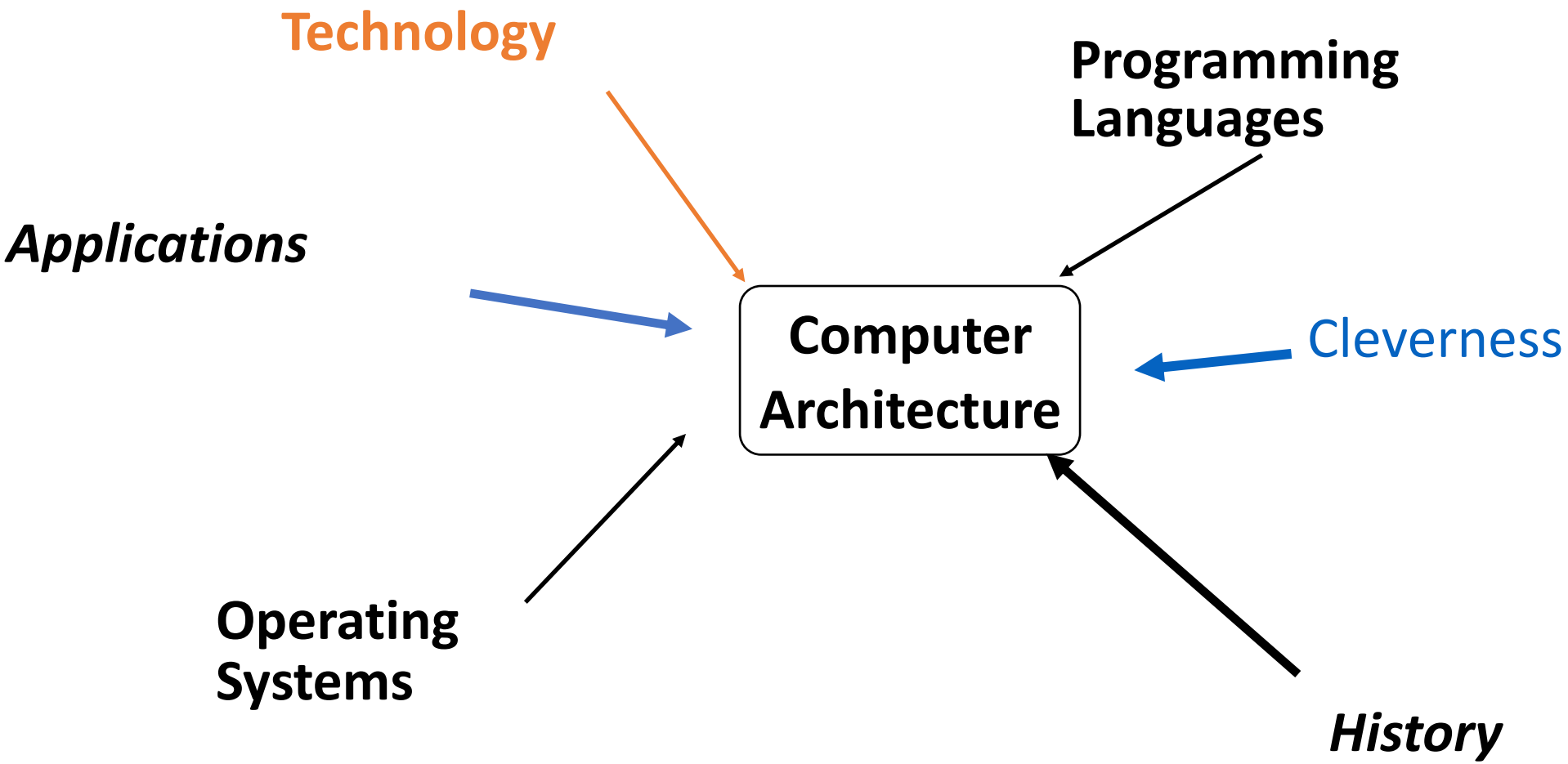
It could be used in Pixels as early as next year

Let’s get started

Since 1946 all computers have had 5 components



Computer Architecture designs



Why Study?

It is everywhere: the moment you wake up till you hit the bed

It is exciting

It is the enabler for all other areas ☺

It will make you a better programmer

Lost in Abstractions

Abstraction is good if you don't care about the performance of underlying entities.

What?

ABSTRACTION BARRIER

How? Why?

How many of you can drive a bike ?

How many of you know how a bike works?

Lost in Abstractions

Abstraction is good if you don't care about the performance of underlying entities.

What?

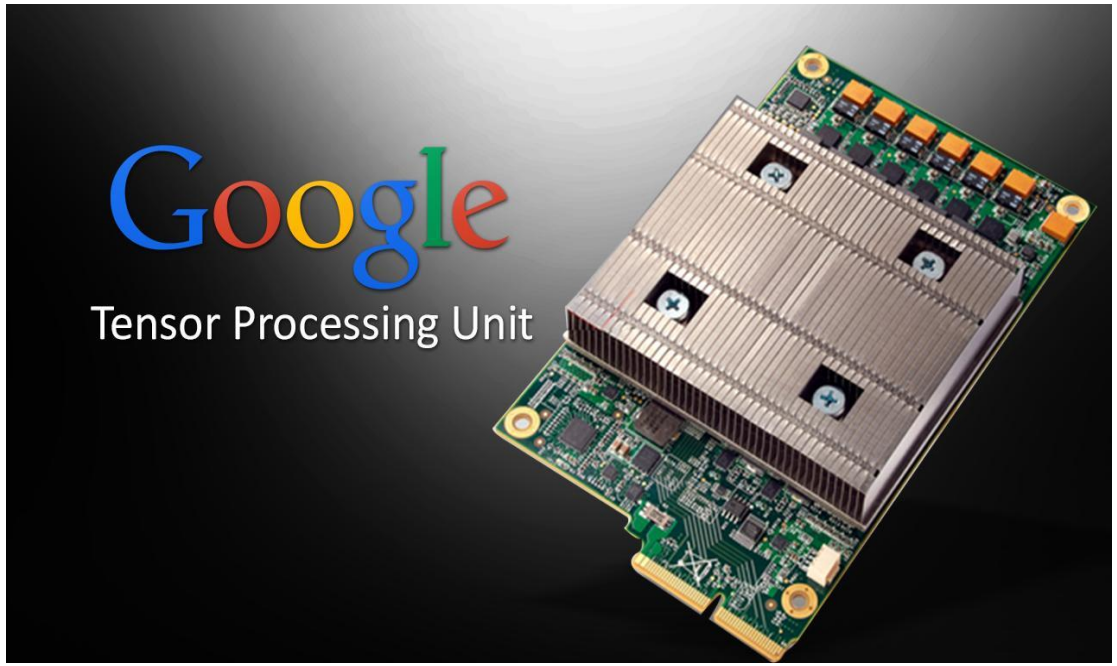
ABSTRACTION BARRIER

How? Why?

How many of you use a computer ? ☺

How many of you know how a computer works?

CS305+341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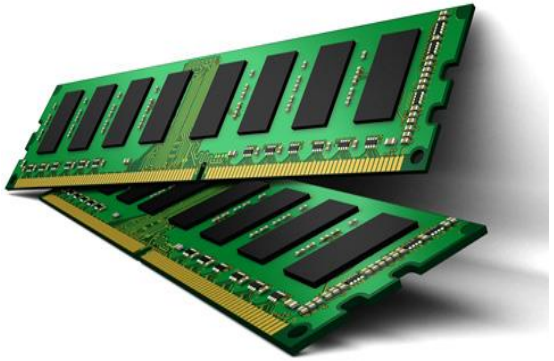



Titan X
GTX 980
Tesla M40
Tesla K80

Let’s get started: One Step at a time

Next Few Lectures

How can a programmer interact with the processor?

The language of computer: Instructions

Instructions have a vocabulary called instruction set

Driven by instruction set architecture (ISA)

ISA: x86, Arm, RISC-V, MIPS

Why MIPS?

Simple yet expressive

Basic principles are similar if not the same. e.g., Arm ISA

Still in use today: embedded devices, routers, modems etc.

ISA: Abstraction layer

Interface between hardware and software

hides complexity from the software through a set of simple instructions

Abstraction Example: 101

a = b + c ; // C code

compiler

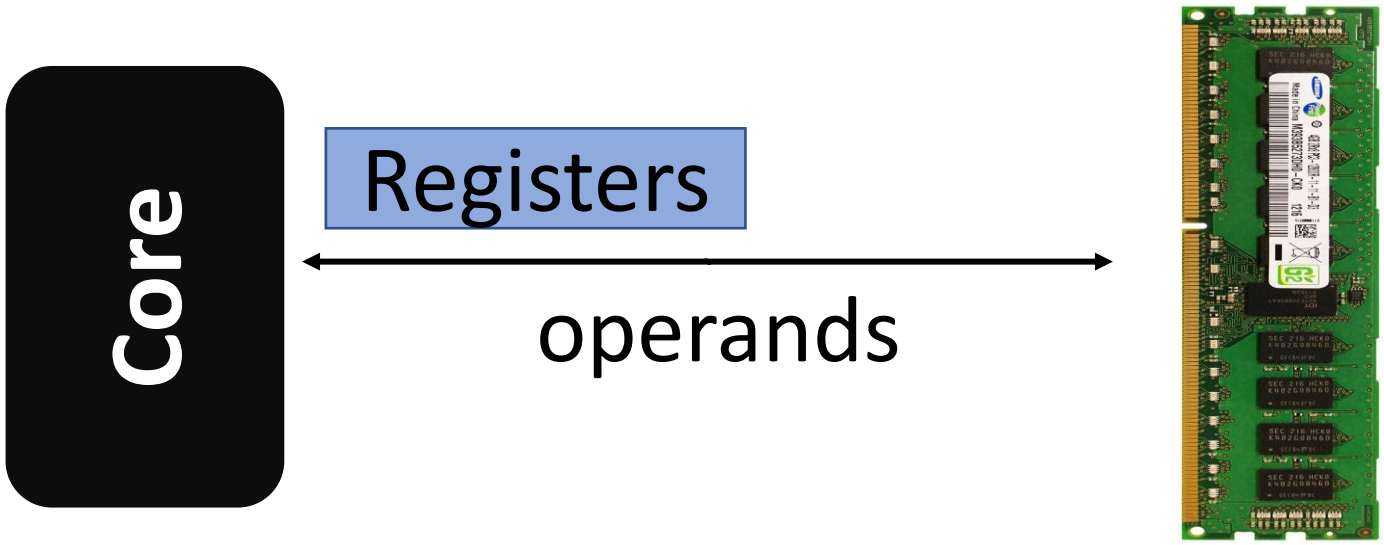
add $1, $2, $3 // assembly language as per the ISA

assembler

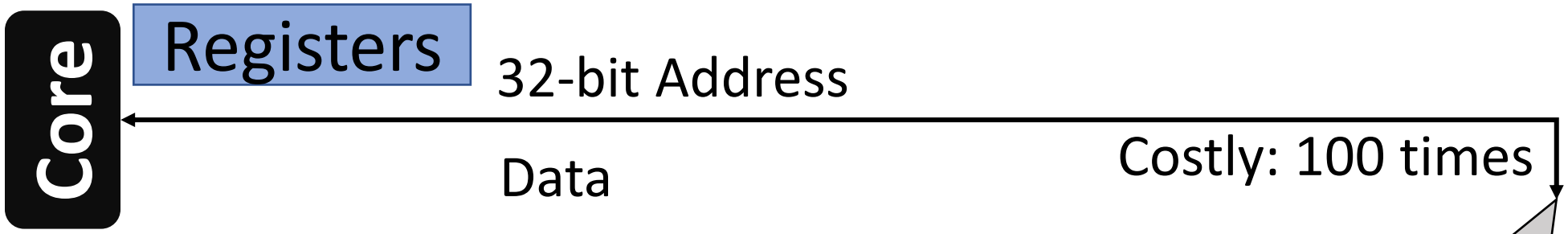
0101010101010101 // machine language, 0s and 1s

Abstraction Example: 101

Operands can be in registers or in memory



A bit detailed



Registers are limited

GBs DRAM

South pole ☹

Thanks

Next Lecture: MIPS Instructions