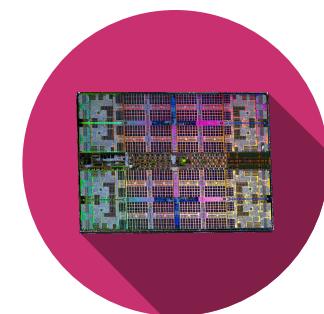




Computer Architecture History His

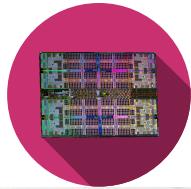
Information and Communication Systems program

Silvan Zahno silvan.zahno@hevs.ch



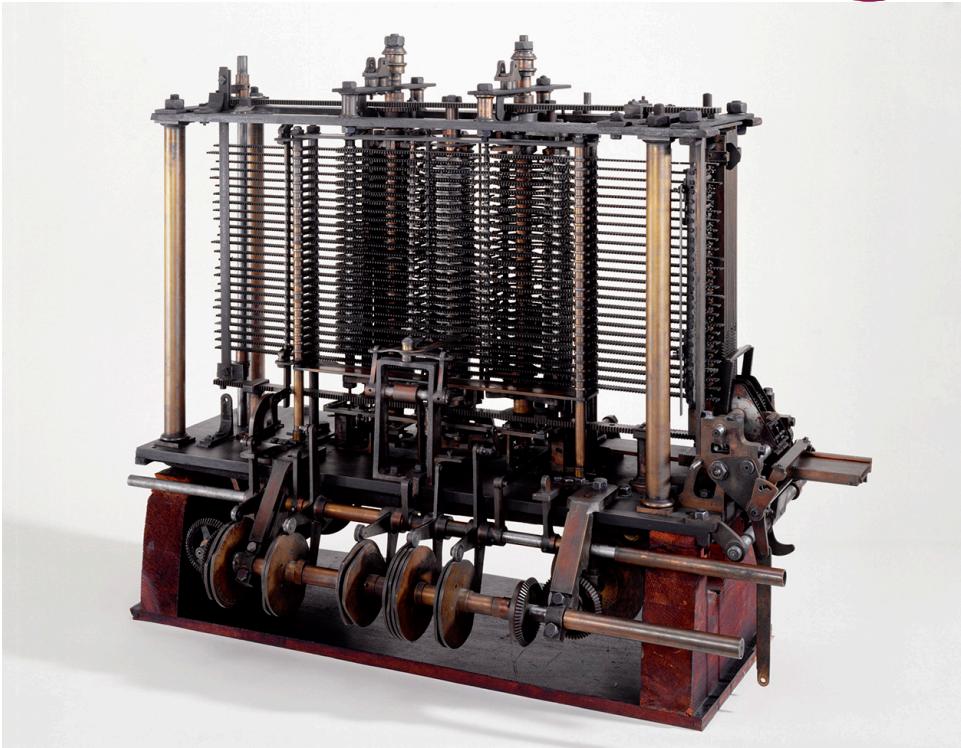
First Computer

Babbage Analytical Engine



- 1834-1871

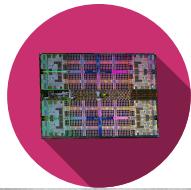
- Arithmetical calculations
- Punch cards to input instructions
- Components
 - Mill for arithmetic calculations
 - Store acting as memory



[1]

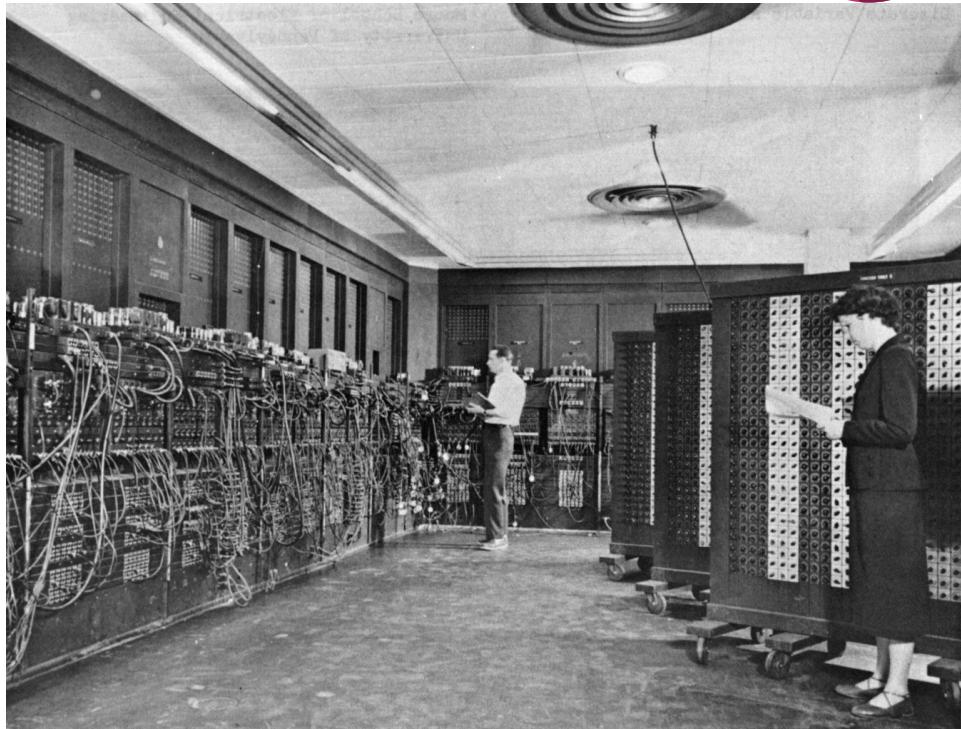
First Computer

ENIAC



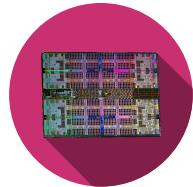
- 1945

- Electronic Numerical Integrator and Computer
- For calculating ballistic tables
- 18'000 vacuum tubes
- 5'000 calculation/sec
- Programmed with cables and switches

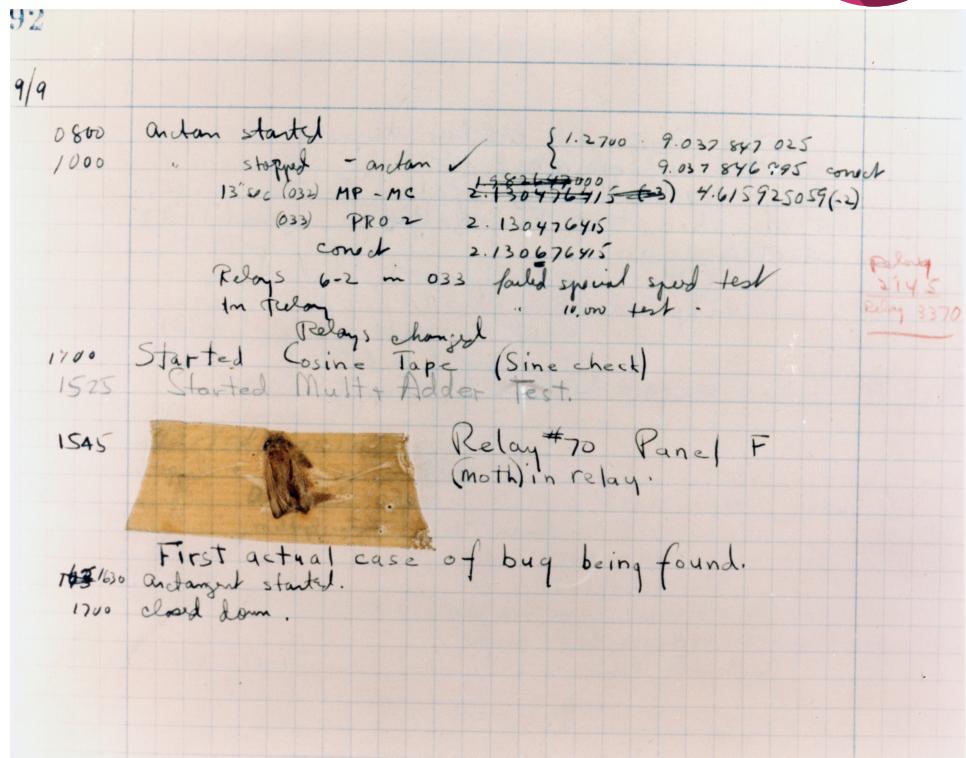


[3]

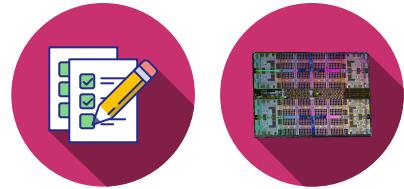
First Bug



- Grace Hopper 1947
- Harvard Mark II
- Moth was found in relay #70

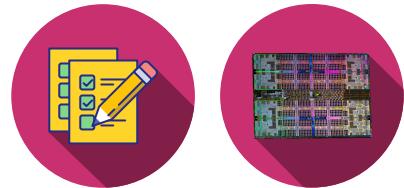


Which computer architectures do you know?



[2]

Which computer architectures do you know?



x86 architecture: This is one of the most popular architectures for personal computers, servers and workstations. It is based on the Intel 8086 processor and has evolved over the years to include various generations of processors including Pentium, Core and Xeon.

ARM architecture: This architecture is widely used in mobile devices, embedded systems and other low-power devices. It is known for its low power consumption and high efficiency.

RISC-V architecture: This is an open source instruction set architecture that is gaining popularity in the industry due to its simplicity, modularity and extensibility.

PowerPC architecture: This architecture was developed by IBM and is used in various systems including high-end workstations, servers, gaming consoles and embedded systems.

SPARC architecture: This architecture was developed by Sun Microsystems and is used in their workstations and servers. It is known for its high performance and scalability.

MIPS architecture: This architecture is used in various systems including routers, game consoles and other embedded systems. It is known for its simplicity and low power consumption.

Z80 architecture: This architecture was popular in the 1980s and was used in many home computers and game consoles. It is known for its simplicity and low cost.

DEC Alpha architecture: This architecture was used in high-end workstations and servers in the 1990s. It is known for its high performance and scalability.

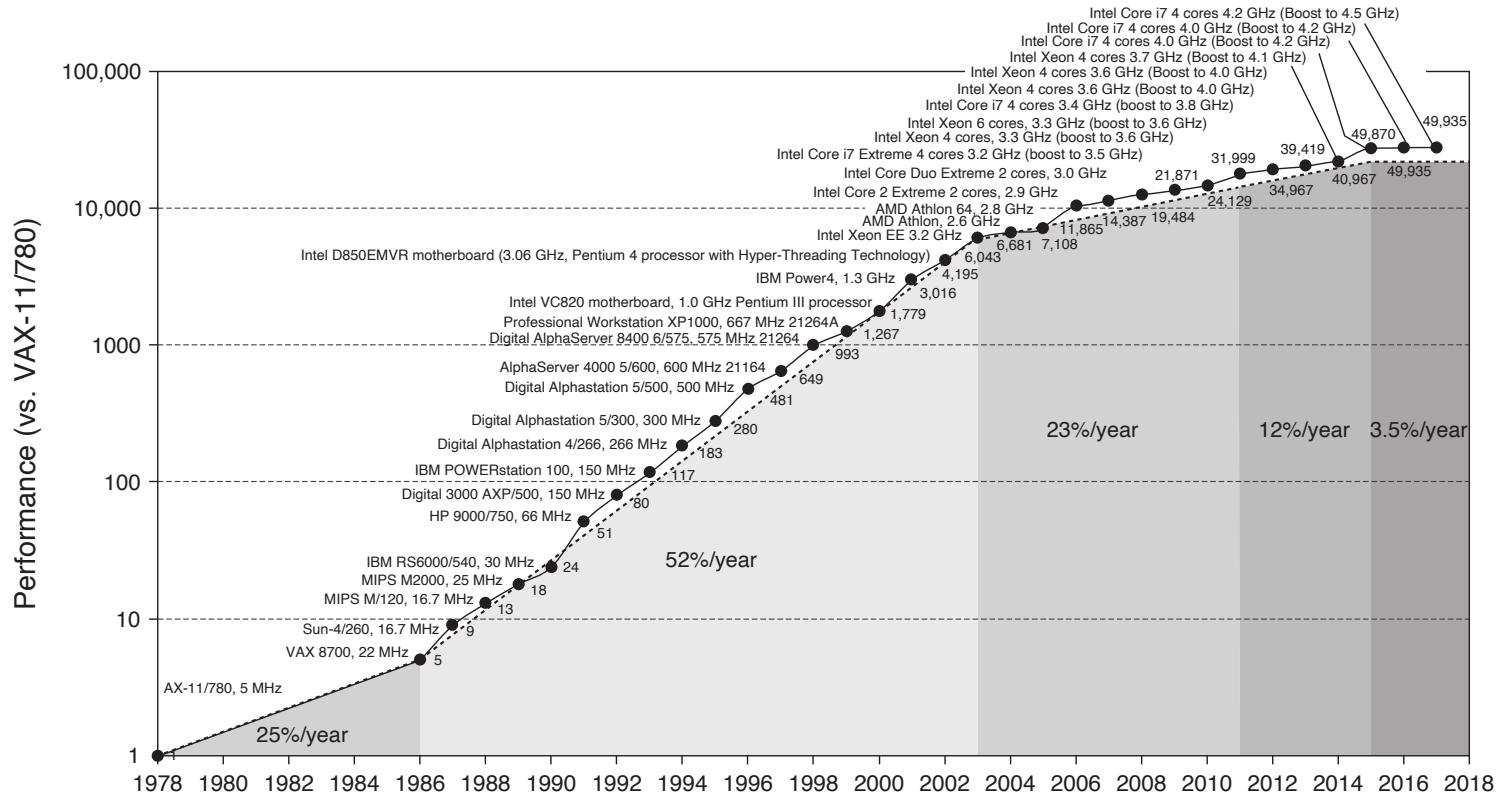
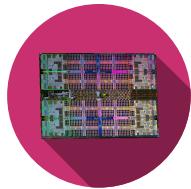
Itanium architecture: This architecture was developed by Intel and is used in high-end servers and workstations. It is known for its high performance and scalability.

IBM System/360 architecture: This architecture was introduced in the 1960s and was one of the first mainframe computer architectures. It is known for its backward compatibility and reliability.

[2]

Sequential Processor Performance

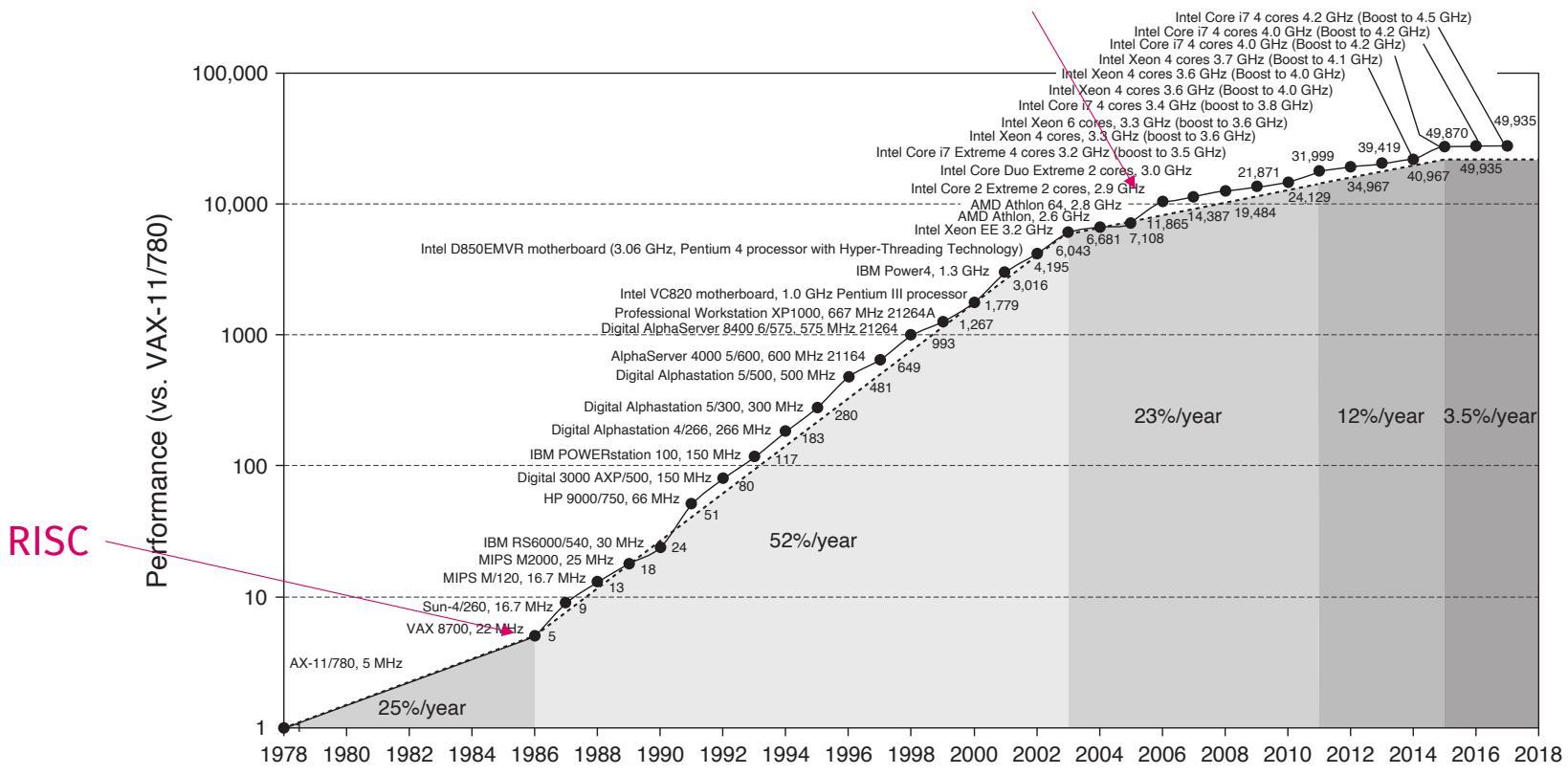
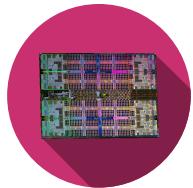
Logplot - Performance vs. Years



[4]

Sequential Processor Performance

Logplot - Performance vs. Years



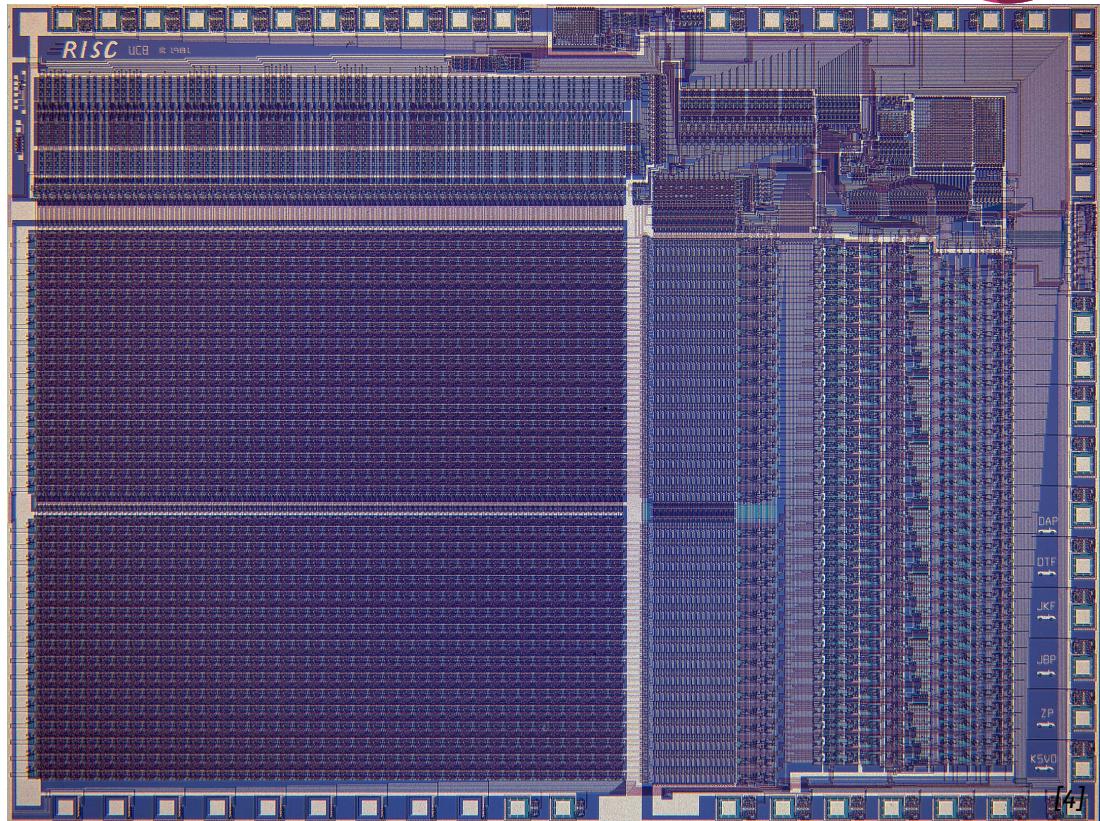
[4]

Computer Architectures

RISC 1

- Basic Pipelined Processor

~50'000 Transistors



CAr His

Image Credit: Berkeley RISC I © University of Berkeley 2018

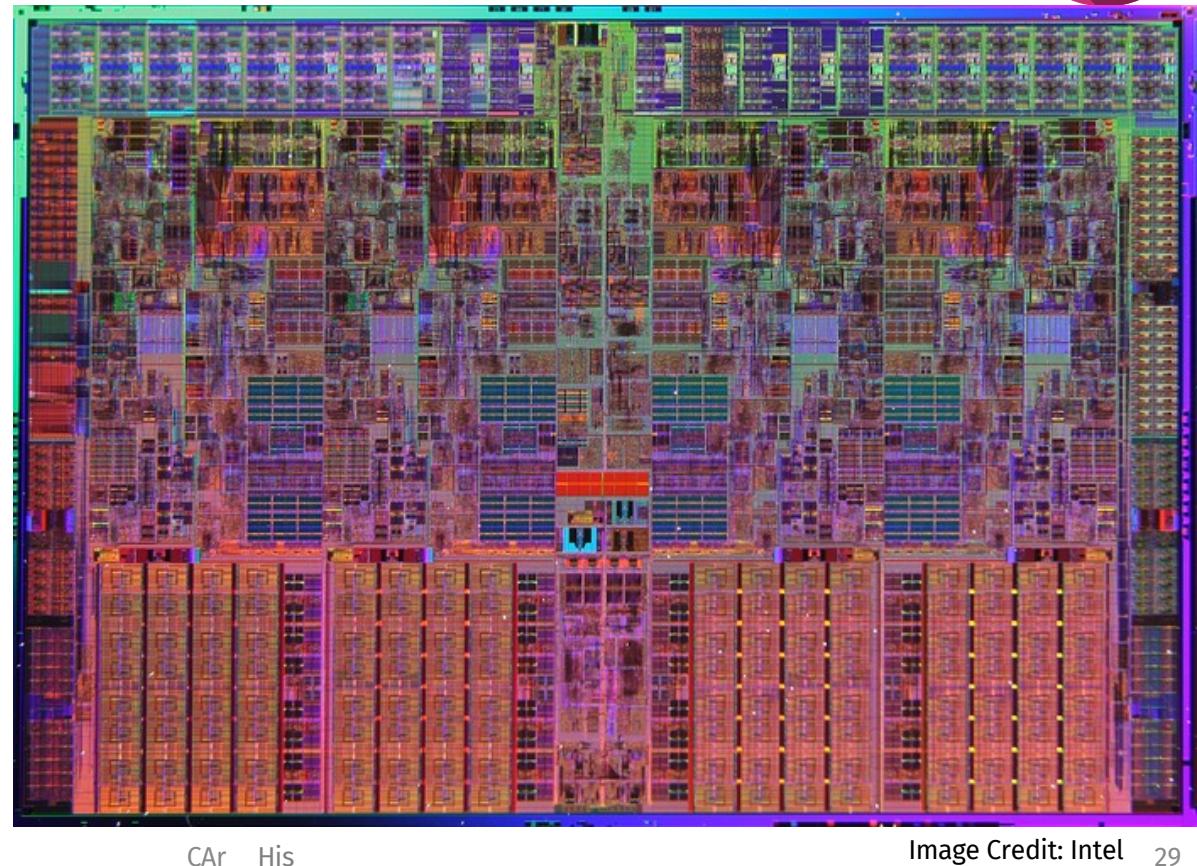
ZaS

Computer Architectures

Original i7 Nehalem

- Instruction Level Parallelism
 - Superscalar
 - Very Long Instruction Word (VLIW)
- Long Pipelines
- Advanced Memory and Caches
- Data Level Parallelism
 - Vector
 - GPU
- Thread Level Parallelism
 - Multithreading
 - Multiprocessor
 - Multicore
 - Manycore

~700'000'000 Transistors



CAr His

Image Credit: Intel 29

Computer Architectures

Original i7 Nehalem

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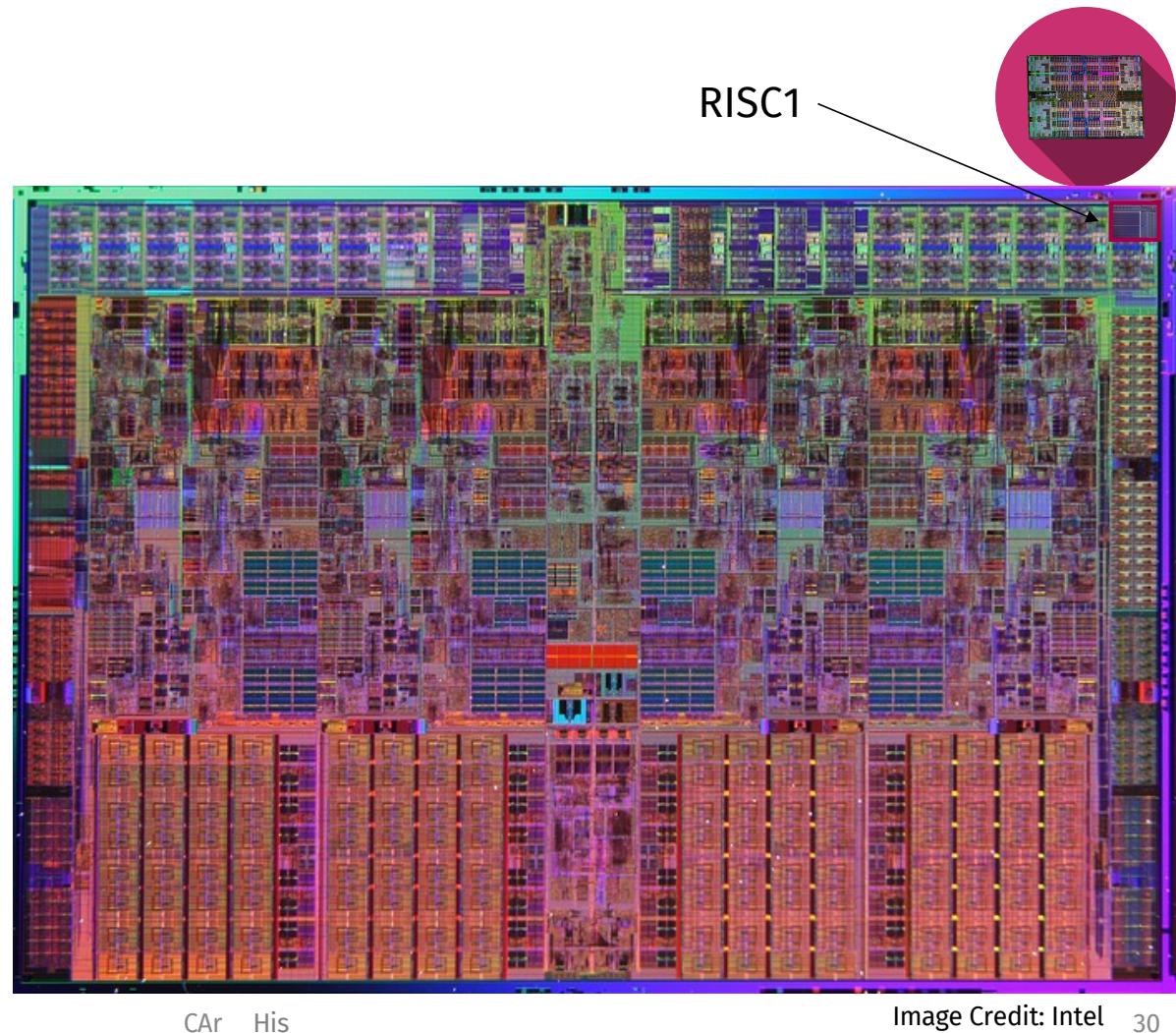
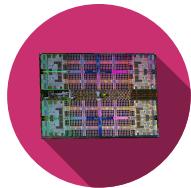


Image Credit: Intel 30

References



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“Bug (engineering),” *Wikipedia*. Jun. 16, 2022. Accessed: Jul. 13, 2022. [Online]. Available: [https://en.wikipedia.org/w/index.php?title=Bug_\(engineering\)&oldid=1093361677](https://en.wikipedia.org/w/index.php?title=Bug_(engineering)&oldid=1093361677)

[3]

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[4]

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[5]

D. Wentzlaff, “Computer Architecture ELE 475 / COS 475.” Princeton University, 2019.

WHY ARE THERE MIRRORS ABOVE BEDS

WHY DO I SAY UH

WHY IS SEA SALT BETTER

WHY ARE THERE TREES IN THE MIDDLE OF FIELDS

WHY IS THERE NOT A POKEMON MMO

WHY IS THERE LAUGHING IN TV SHOWS

WHY ARE THERE DOORS ON THE FREEWAY

WHY ARE THERE SO MANY SUCHHOST-EXE RUNNING

WHY AREN'T ANY COUNTRIES IN ANTARCTICA

WHY ARE THERE SCARY SOUNDS IN MINECRAFT

WHY IS THERE KICKING IN MY STOMACH

WHY ARE THERE TWO SLASHES AFTER HTTP

WHY ARE THERE CELEBRITIES

WHY DO SNAKES EXIST

WHY DO OYSTERS HAVE PEARLS

WHY ARE DUCKS CALLED DUCKS

WHY DO THEY CALL IT THE CLAP

WHY ARE KYLE AND CARTMAN FRIENDS

WHY IS THERE AN ARROW ON AANG'S HEAD

WHY ARE TEXT MESSAGES BLUE

WHY ARE THERE MUSTACHES ON CLOTHES

WHY WUBA LUBBA DUB DUB MEANING

WHY IS THERE A WHALE AND A POT FALLING

WHY ARE THERE SO MANY BIRDS IN SWISS

WHY IS THERE SO LITTLE RAIN IN WALLIS

WHY IS WALLIS WEATHER FORECAST ALWAYS WRONG

WHY ARE THERE MALE AND FEMALE BIKES

WHY ARE THERE BRIDESMAIDS

WHY DO DYING PEOPLE REACH UP

HOW FAST IS LIGHTSPEED

WHY ARE OLD KUNGONS DIFFERENT

WHY ARE THERE SQUIRRELS

WHY IS THERE HELL IF G

WHY ARE THERE FEMALE

WHY DO SPYDER BITES ITCH

WHY IS DYING SO SCARY

WHY IS THERE NO GPS IN LAPTOPS

WHY DO KNEES CLICK

WHY AREN'T THERE F GRADS

WHY IS THERE CAFFEINE IN MY SHAMPOO

WHY HAVE DINOSAURS NO FUR

WHY ARE SWISS AFRAID OF DRAGONS

WHY IS THERE A LINE THROUGH HTTPS

WHY IS THERE A RED LINE THROUGH HTTPS ON TWITTER

WHY IS HTTPS IMPORTANT

WHY ARE THERE WEEKS

WHY DO I FEEL DIZZY

QUESTIONS

CAN BE ASKED BY ANYONE ANYTIME

WHY AREN'T ECONOMISTS RICH

WHY DO AMERICANS CALL IT SOCCER

WHY ARE MY EARS RINGING

WHY IS 42 THE ANSWER TO EVERYTHING

WHY CAN'T NOBODY ELSE LIFT THORS HAMMER

WHY IS MARVIN ALWAYS SO SAD

WHY ARE THERE ANTS IN MY LAPTOP

WHY IS EARTH TILTED

WHY IS SPACE BLACK

WHY IS OUTER SPACE SO COLD

WHY ARE THERE PYRAMIDS ON THE MOON

WHY IS NASA SHUTTING DOWN

WHY ARE THERE TINY SPIDERS IN MY HOUSE

WHY DO SPIDERS COME INSIDE

WHY ARE THERE HUGE SPIDERS IN MY HOUSE

WHY ARE THERE LOTS OF SPIDERS IN MY HOUSE

WHY ARE THERE SPIDERS IN MY ROOM

WHY ARE THERE SO MANY SPIDERS IN MY ROOM

WHY DO SPYDER BITES ITCH

WHY IS DYING SO SCARY

WHY IS THERE NO GPS IN LAPTOPS

WHY DO KNEES CLICK

WHY AREN'T THERE F GRADS

WHY ARE THERE GHOSTS

WHY ARE THERE FEMALE

WHY ARE THERE OBELISKS

WHY ARE THERE T-MINUS

WHY ARE THERE WRESTLERS ALWAYS WET

WHY ARE OCEANS BECOMMING MORE ACIDIC

WHY ARE THERE GUNS IN HARRY POTTER

WHY AREN'T THERE F GRADS

WHY ARE THERE FEMALE

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WHY ARE THERE WRESTLERS ALWAYS WET

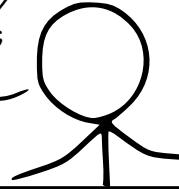
WHY ARE OCEANS BECOMMING MORE ACIDIC

WHY ARE THERE GUNS IN HARRY POTTER

WHY AREN'T THERE F GRADS



WHY AREN'T MY ARMS GROWING

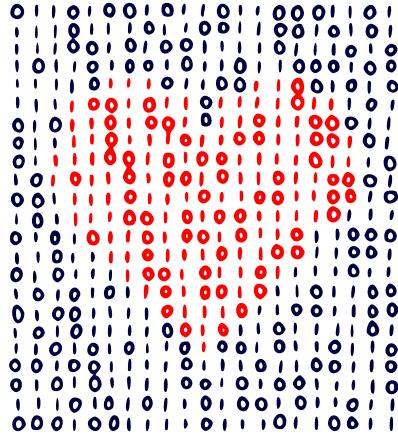


WHY ARE THERE WEEKS

WHY DO I FEEL DIZZY

WHY ARE DOGS AFRAID OF FIRE

WHY IS THERE NO KING IN ENGLAND



Hes·so // VALAIS
WALLIS



Haute Ecole d'Ingénierie
Hochschule für Ingenieurwissenschaften

Silvan Zahno silvan.zahno@hevs.ch

