

Outline

- Architecture of a RISC Processor
- Implementation**



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Implementation

- RISC vs. CISC concept**
- Concept of pipeline
- An implementation of Mips
- Pipeline's problems

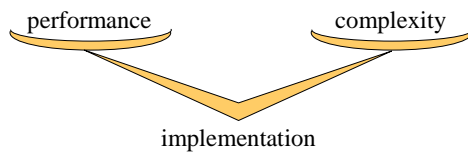


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RISC vs. CISC concept

A given architecture can be implemented in many different ways



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RISC vs. CISC concept

The RISC concept has been developed in early 80's

CISC

Complex
Instruction
Set
Computer

RISC

Reduce
Instruction
Set
Computer



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RISC vs. CISC concept

The basic idea of CISCs

Use the constant improvement of the technology to offer a more powerful **architecture**

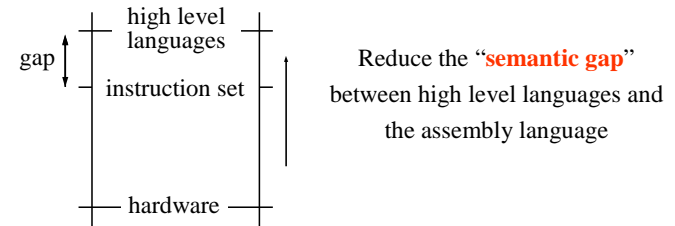
It is easier to program with a powerful assembly language



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RISC vs. CISC concept



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Examples:

Strcmp (IBM 370) : string compare

`strcmp ()` → *strcmp*

Add with 3 operands in memory (VAX)

`a = b + c ;` → *add @a , @b , @c*



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RISC vs. CISC concept

The basic idea of RISCs

Simplify the hardware

It is easier to design a simple hardware



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RISC vs. CISC concept

3 factors have worked towards the apparition of the RISC concept

- Economical factor
- User factor
- Technology factor



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RISC vs. CISC concept

Economical factor

$$A = B + C ;$$

VAX complex instruction	Equivalent Mips code
Add @a, @b, @c	Lw R1, @b Lw R2, @c Add R3, R1, R2 Sw R3, @a

8 bytes

16 bytes



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RISC vs. CISC concept

Economical factor

A given program compiled for a RISC processor is 2 to 3 times bigger than the same code generated for a CISC

Strong argument in favor of CISC

..... in 60's - 70's



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RISC vs. CISC concept

User factor

It is easier to program with a powerful assembly language

Strong argument in favor of CISC



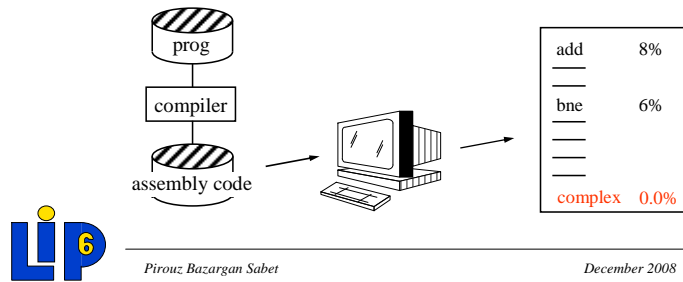
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RISC vs. CISC concept

User factor

designing a new processeur ⇔ check the MIX



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RISC vs. CISC concept

User factor

complex instructions are **NOT** used



in contradiction with the
CISC concept



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RISC vs. CISC concept

User factor

In 80's assembly language programmers have
been replaced by compilers

A compiler can only use simple instructions



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RISC vs. CISC concept

User factor

It is easier to program with a powerful
assembly language for a human

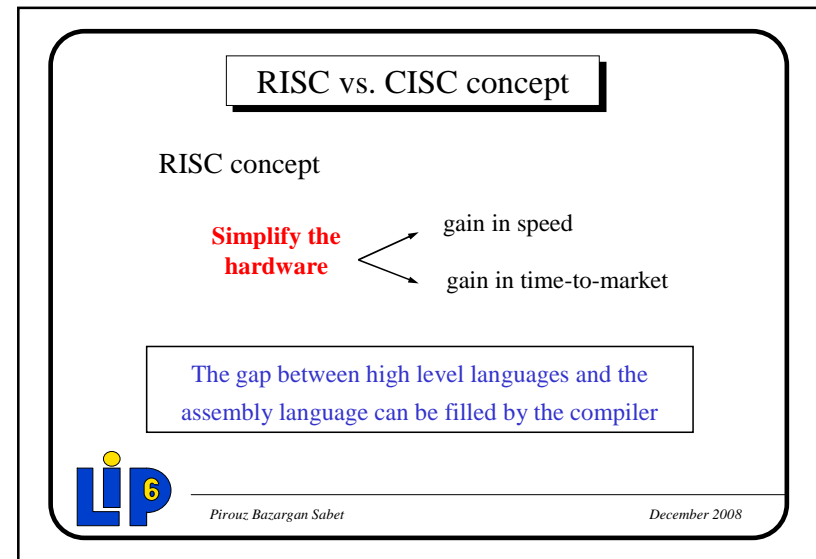
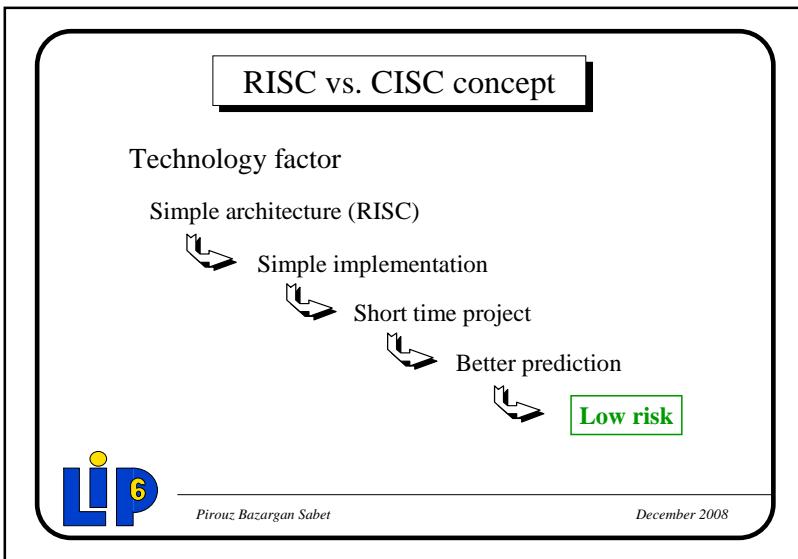
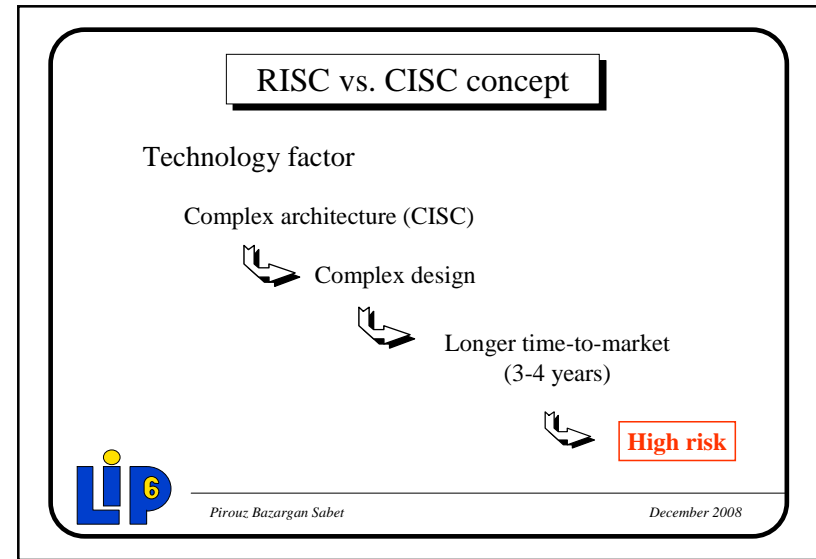
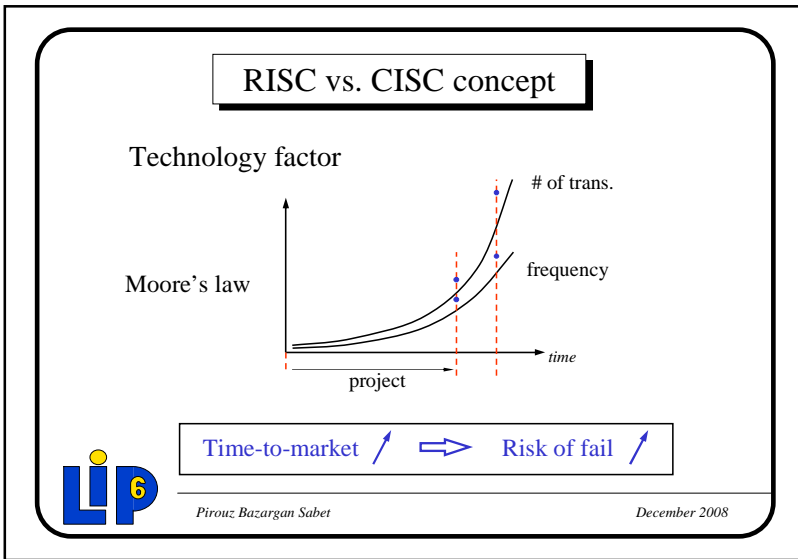
Strong argument in favor of CISC

..... in 60's - 70's



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RISC vs. CISC concept

RISC concept

~~Reduce
Instruction
Set
Computer~~

Reject
Important
Stuff into the
Compiler



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