Computer Architecture

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Keep in mind there are *two* PDFs available (of which this is the latter):

1. a PDF of examinable material used as lecture slides, and
2. a PDF of non-examinable, extra material:
   - the associated notes page may be pre-populated with extra, written explaination of material covered in lecture(s), plus
   - anything with a "grey'ed out" header/footer represents extra material which is useful and/or interesting but out of scope (and hence not covered).

Notes:

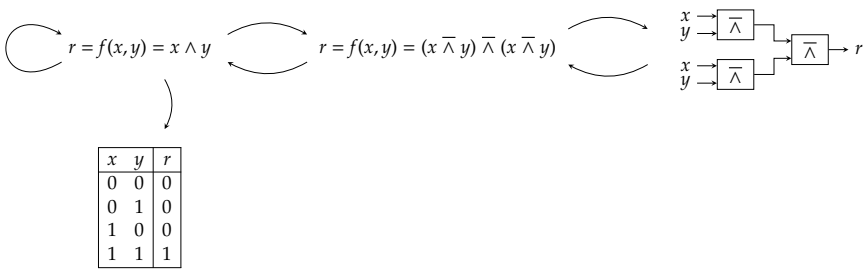
Notes:

- Agenda:
  1. ...

Notes:

Unit summary (1)

Low-level perspective: arc #1 = "no remaining magic between abstract and concrete computation"

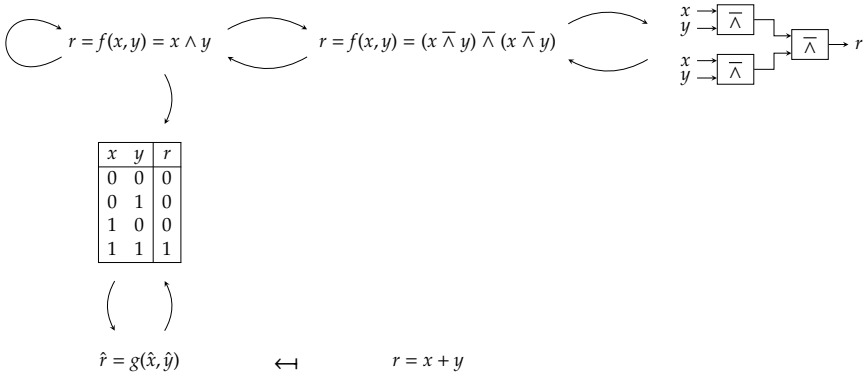


x	y	r
0	0	0
0	1	0
1	0	0
1	1	1

Notes:

Unit summary (1)

Low-level perspective: arc #1 = "no remaining magic between abstract and concrete computation"



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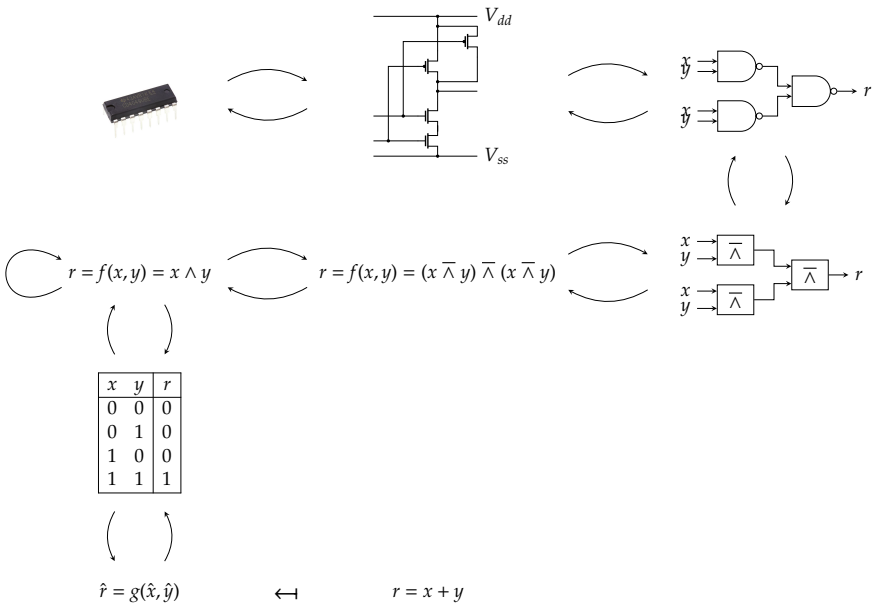
Notes:

Unit summary (1)

Low-level perspective: arc #1 = "no remaining magic between abstract and concrete computation"



x	y	r
0	0	0
0	1	0
1	0	0
1	1	1

Notes:

Unit summary (2)

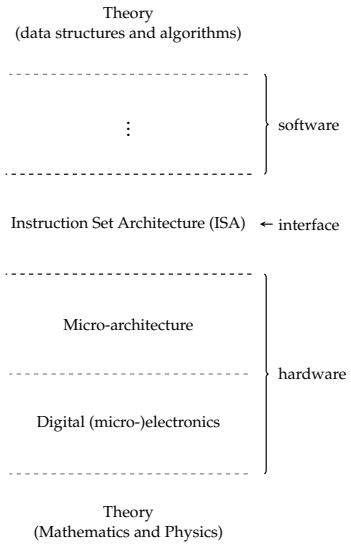
Low-level perspective: arc #2 = "progressively more involved versions of addition"

theory	$\rightsquigarrow$	representation		unsigned and signed integer
theory	$\rightsquigarrow$	computation		"school-book" addition algorithm
⋮				
combinatorial logic	$\rightsquigarrow$	fixed function computation,	not stateful	full-adder cell, ripple-carry adder
sequential logic	$\rightsquigarrow$	fixed function computation,	stateful	counter
FSM	$\rightsquigarrow$	fixed function computation,	stateful	
RM	$\rightsquigarrow$	not fixed function computation,	stateful	counter machine
⋮				
micro-processor	$\rightsquigarrow$	not fixed function computation,	stateful	add instruction

Notes:

Unit summary (3)

High-level perspective



Notes:

Unit summary (3)
High-level perspective

Theory
(data structures and algorithms)

⋮ — software

Instruction Set Architecture (ISA) ← interface

Micro-architecture — hardware

Digital (micro-)electronics — hardware

Boolean algebra, integer representation and arithmetic (1)

Theory
(Mathematics and Physics)

Notes:

Unit summary (3)
High-level perspective

Theory
(data structures and algorithms)

⋮ — software

Instruction Set Architecture (ISA) ← interface

Micro-architecture — hardware

Transistors (2)
Combinatorial (or stateless) logic, Karnaugh maps (2)

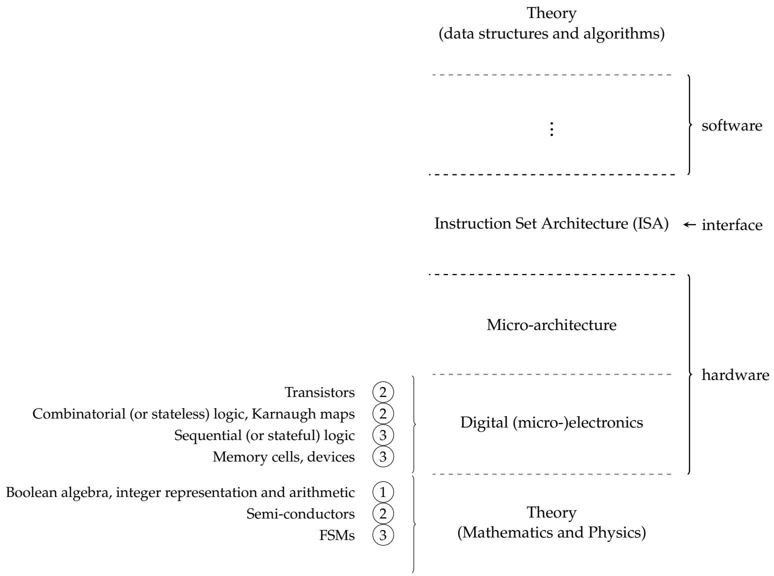
Digital (micro-)electronics — hardware

Boolean algebra, integer representation and arithmetic (1)
Semi-conductors (2)

Theory
(Mathematics and Physics)

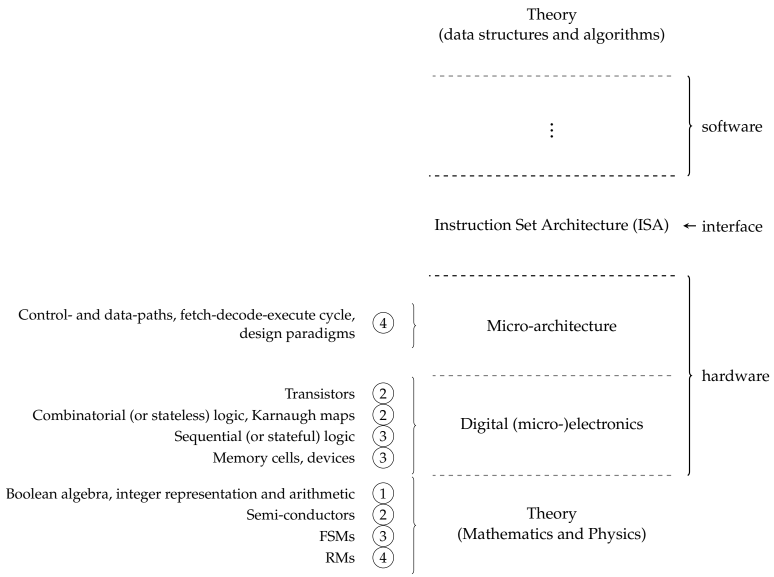
Notes:

Unit summary (3)
High-level perspective



Notes:

Unit summary (3)
High-level perspective



Notes:

Conclusions

- Take away points:
  1. ...

Notes:

References

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