Computer Science E-1

Understanding Computers and the Internet

Lecture 1: Hardware

Wednesday, 20 September 2006

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Computation

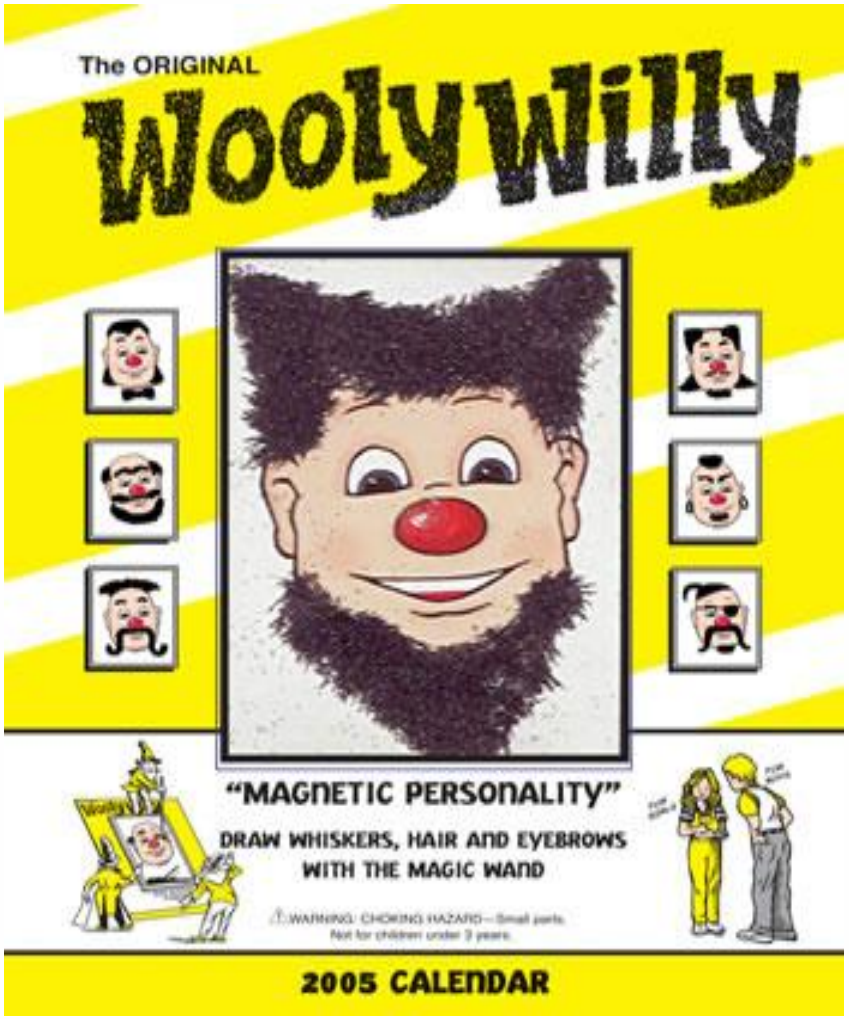
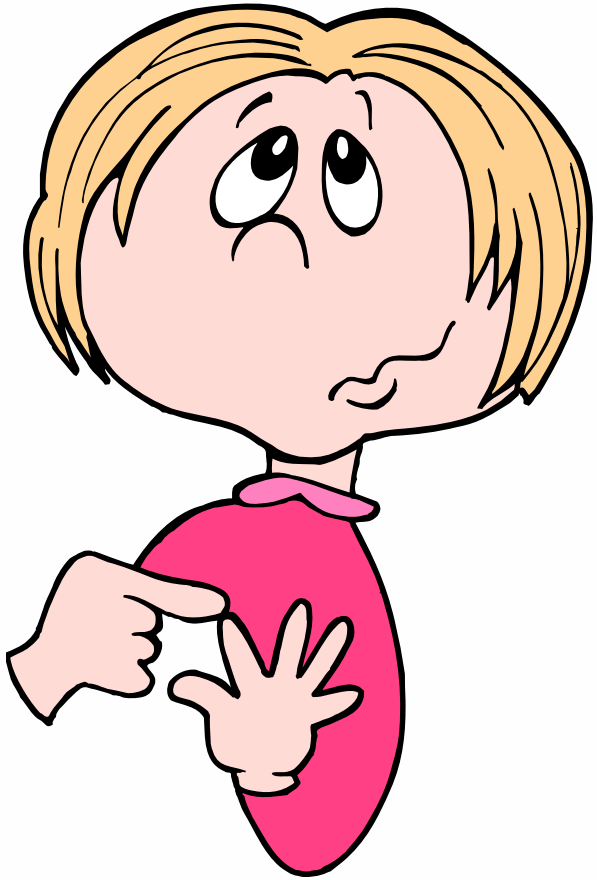
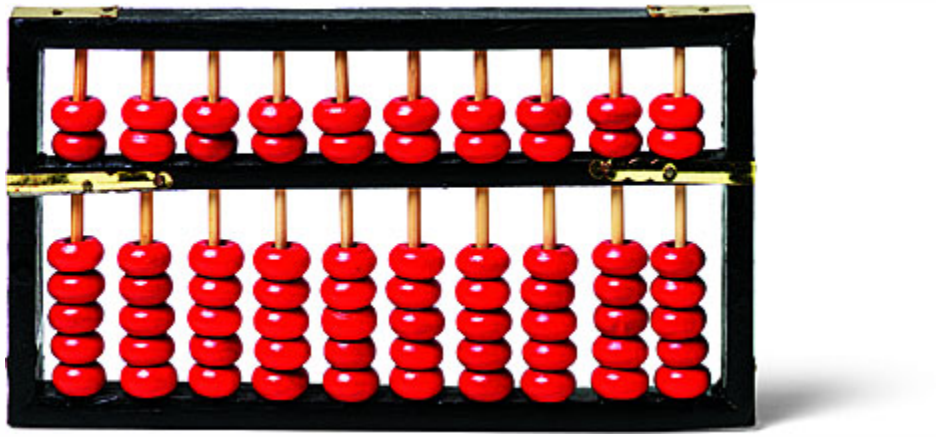


Image from http://www.andale.com/img/template.jsp.

Computation



Computation



Computation

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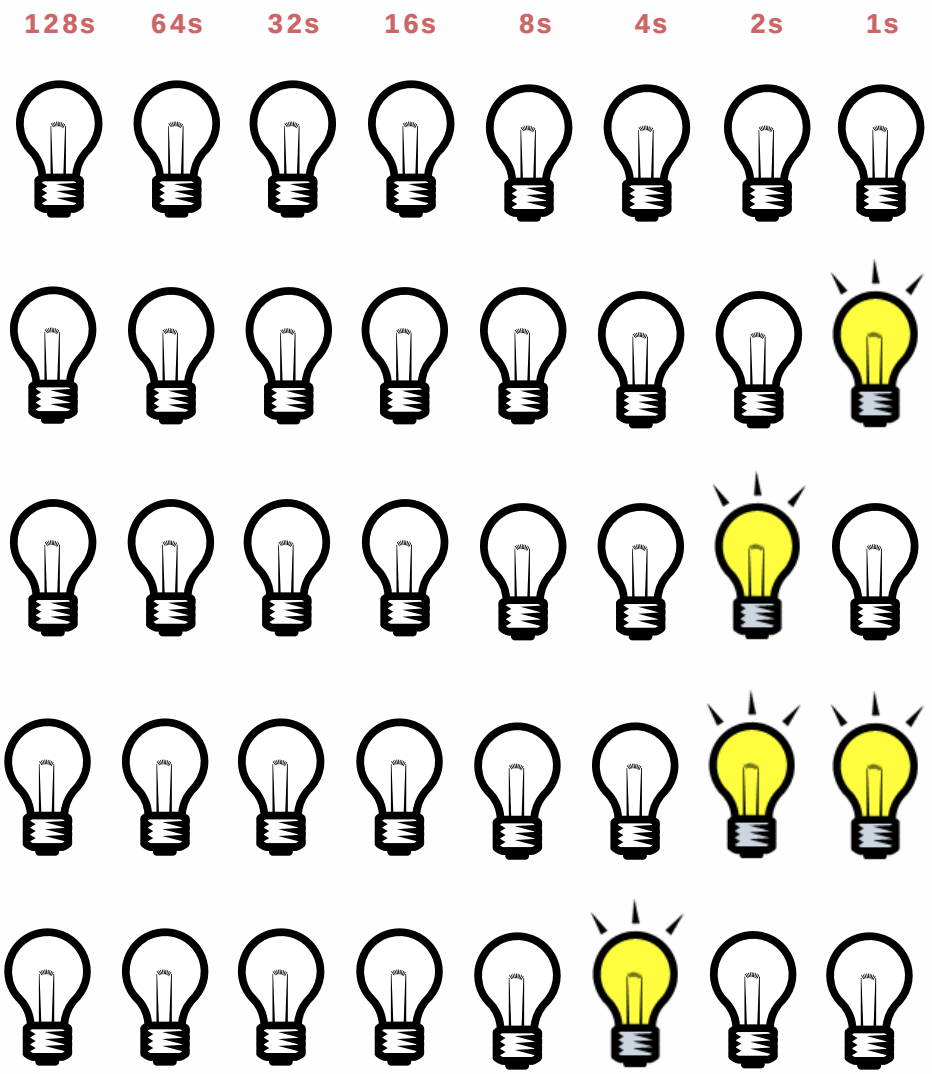
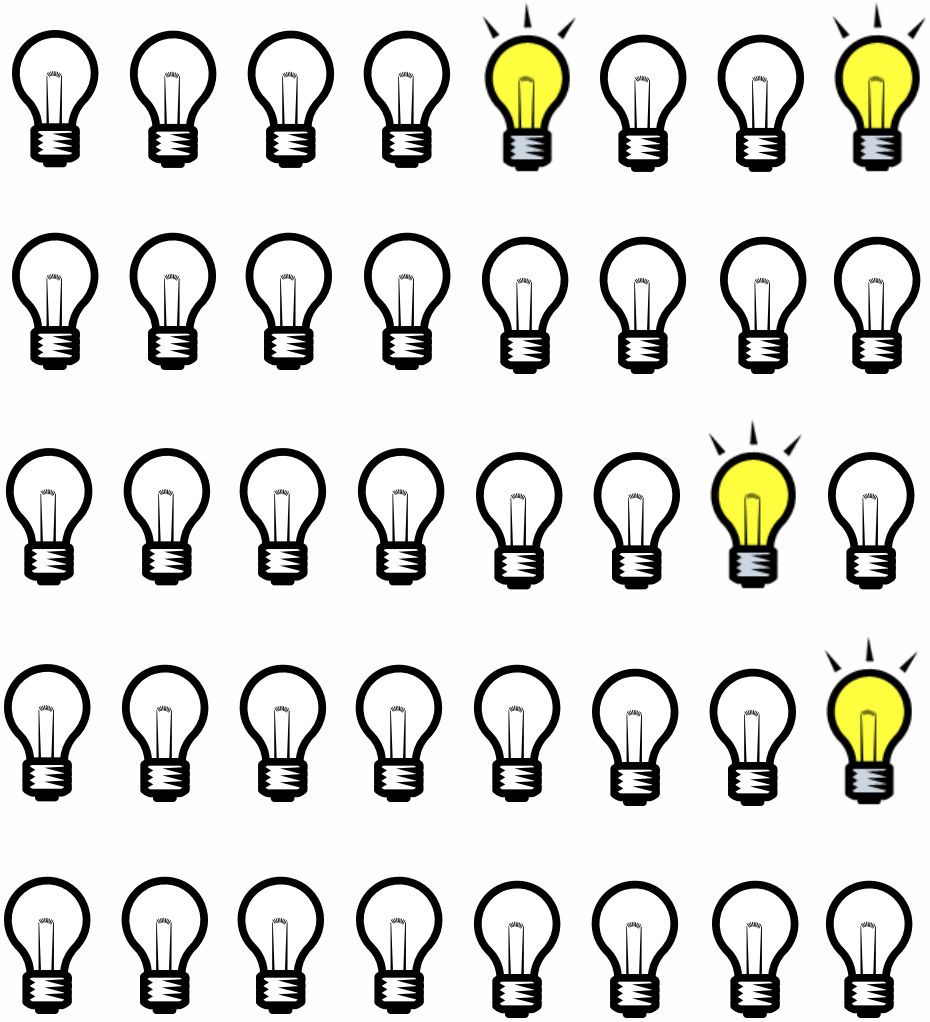
Computation



Computation

Computation



Computation

0 0 0 0 1 0 0 1

0 0 0 0 0 0 0 0

0 0 0 0 0 0 1 0

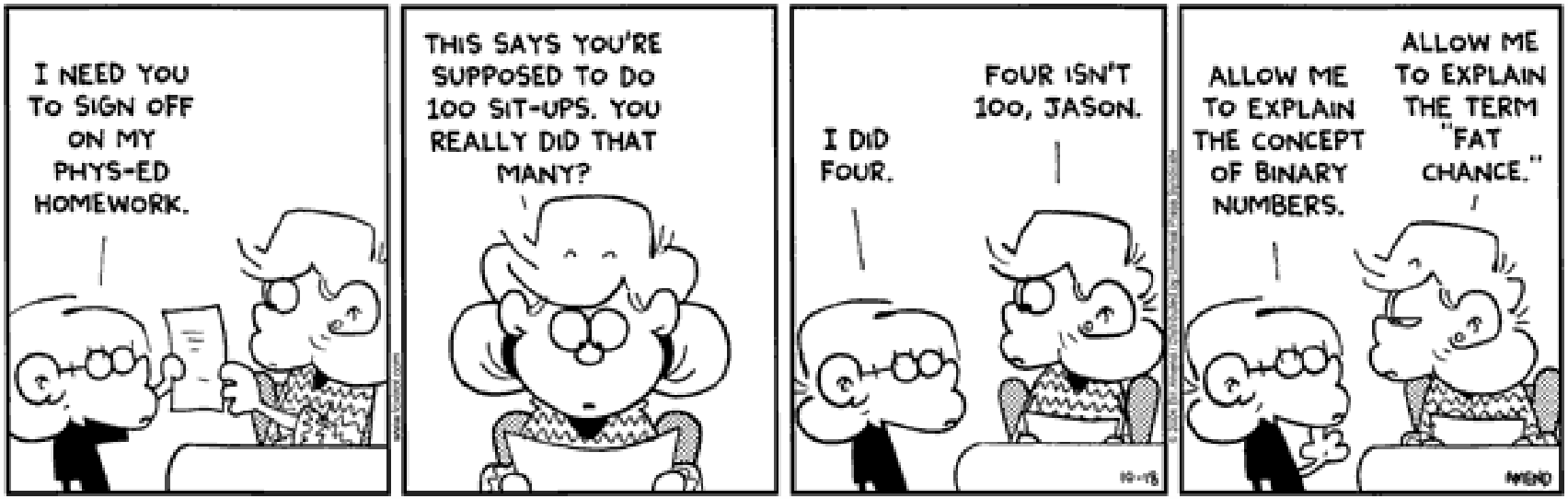
0 0 0 0 0 0 0 1

0 0 0 0 0 0 0 0

Computation

Base-10	Base-2
0	
1	
2	
3	
4	
5	
6	
7	
...	
15	
...	
255	
256	

Computation



Bits and Bytes

Unit	Abbreviation	Definition
bit	b	0 or 1
byte	B	8 b
		1,024 B
		1,048,576 B
		1,073,741,824 B
		1,099,511,627,776 B

ASCII

Dec	Hx	Oct	Char	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr	Dec	Hx	Oct	Html	Chr
0	0	000	NUL (null)	32	20	040		Space	64	40	100	@	@	96	60	140	`	`
1	1	001	SOH (start of heading)	33	21	041	!	!	65	41	101	A	A	97	61	141	a	a
2	2	002	STX (start of text)	34	22	042	"	"	66	42	102	B	B	98	62	142	b	b
3	3	003	ETX (end of text)	35	23	043	#	#	67	43	103	C	C	99	63	143	c	c
4	4	004	EOT (end of transmission)	36	24	044	$	$	68	44	104	D	D	100	64	144	d	d
5	5	005	ENQ (enquiry)	37	25	045	%	%	69	45	105	E	E	101	65	145	e	e
6	6	006	ACK (acknowledge)	38	26	046	&	&	70	46	106	F	F	102	66	146	f	f
7	7	007	BEL (bell)	39	27	047	'	'	71	47	107	G	G	103	67	147	g	g
8	8	010	BS (backspace)	40	28	050	(	(	72	48	110	H	H	104	68	150	h	h
9	9	011	TAB (horizontal tab)	41	29	051	)	)	73	49	111	I	I	105	69	151	i	i
10	A	012	LF (NL line feed, new line)	42	2A	052	*	*	74	4A	112	J	J	106	6A	152	j	j
11	B	013	VT (vertical tab)	43	2B	053	+	+	75	4B	113	K	K	107	6B	153	k	k
12	C	014	FF (NP form feed, new page)	44	2C	054	,	,	76	4C	114	L	L	108	6C	154	l	l
13	D	015	CR (carriage return)	45	2D	055	-	-	77	4D	115	M	M	109	6D	155	m	m
14	E	016	SO (shift out)	46	2E	056	.	.	78	4E	116	N	N	110	6E	156	n	n
15	F	017	SI (shift in)	47	2F	057	/	/	79	4F	117	O	O	111	6F	157	o	o
16	10	020	DLE (data link escape)	48	30	060	0	0	80	50	120	P	P	112	70	160	p	p
17	11	021	DC1 (device control 1)	49	31	061	1	1	81	51	121	Q	Q	113	71	161	q	q
18	12	022	DC2 (device control 2)	50	32	062	2	2	82	52	122	R	R	114	72	162	r	r
19	13	023	DC3 (device control 3)	51	33	063	3	3	83	53	123	S	S	115	73	163	s	s
20	14	024	DC4 (device control 4)	52	34	064	4	4	84	54	124	T	T	116	74	164	t	t
21	15	025	NAK (negative acknowledge)	53	35	065	5	5	85	55	125	U	U	117	75	165	u	u
22	16	026	SYN (synchronous idle)	54	36	066	6	6	86	56	126	V	V	118	76	166	v	v
23	17	027	ETB (end of trans. block)	55	37	067	7	7	87	57	127	W	W	119	77	167	w	w
24	18	030	CAN (cancel)	56	38	070	8	8	88	58	130	X	X	120	78	170	x	x
25	19	031	EM (end of medium)	57	39	071	9	9	89	59	131	Y	Y	121	79	171	y	y
26	1A	032	SUB (substitute)	58	3A	072	:	:	90	5A	132	Z	Z	122	7A	172	z	z
27	1B	033	ESC (escape)	59	3B	073	;	;	91	5B	133	[	[	123	7B	173	{	{
28	1C	034	FS (file separator)	60	3C	074	<	<	92	5C	134	\	\	124	7C	174			|
29	1D	035	GS (group separator)	61	3D	075	=	=	93	5D	135	]	]	125	7D	175	}	}
30	1E	036	RS (record separator)	62	3E	076	>	>	94	5E	136	^	^	126	7E	176	~	~
31	1F	037	US (unit separator)	63	3F	077	?	?	95	5F	137	_	_	127	7F	177	&#127;	DEL

Source: www.asciitable.com

ASCII

128	Ç	144	É	160	á	176	▒	193	┴	209	╤	225	ß	241	±
129	ü	145	æ	161	í	177	▒	194	┬	210	╥	226	Γ	242	≥
130	é	146	Æ	162	ó	178	▓	195	├	211	╙	227	π	243	≤
131	â	147	ô	163	ú	179	│	196	─	212	╘	228	Σ	244	⌠
132	ä	148	ö	164	ñ	180	┤	197	┼	213	╒	229	σ	245	⌡
133	à	149	ò	165	Ñ	181	╡	198	╞	214	╓	230	µ	246	÷
134	å	150	û	166	ª	182	╢	199	╟	215	╫	231	τ	247	≈
135	ç	151	ù	167	º	183	╖	200	╚	216	╪	232	Φ	248	°
136	ê	152	ÿ	168	¿	184	╕	201	╔	217	┘	233	Θ	249	∙
137	ë	153	Ö	169	⌐	185	╣	202	╩	218	┌	234	Ω	250	·
138	è	154	Ü	170	¬	186	║	203	╦	219	█	235	δ	251	√
139	ï	156	£	171	½	187	╗	204	╠	220	▄	236	∞	252	ⁿ
140	î	157	¥	172	¼	188	╝	205	═	221	▌	237	φ	253	²
141	ì	158	₧	173	¡	189	╜	206	╬	222	▐	238	ε	254	■
142	Ä	159	ƒ	174	«	190	╛	207	╧	223	▀	239	∩	255	
143	Å	192	└	175	»	191	┐	208	╨	224	α	240	≡		

Source: www.asciitable.com

Agenda

- Computation
- Overview
- Bits and Bytes
- ASCII
- Processors
- Motherboards
  - Buses, Connectors, Ports, Slots, Sockets
- Memory
  - ROM
    - BIOS
    - CMOS
    - POST
  - RAM
  - Cache

Overview

Expectations

You are expected to attend or watch all lectures, complete nine problem sets, take two exams, and produce a final project.

Overview

Lectures

Hardware

Software

The Internet

Multimedia

Security

Website Development

Programming

Dotcoms

...

Overview

Books

Set One: for True Beginners

Computers Are Your Future 2006, Complete Edition
How the Internet Works, Seventh Edition
How to Use HTML and XHTML
Teach Yourself VISUALLY Computers, Fourth Edition

Set Two: for Students More Savvy

Computers Are Your Future 2006, Complete Edition
How Computers Work, Eighth Edition
How the Internet Works, Seventh Edition
HTML for the World Wide Web with XHTML and CSS: Visual QuickStart Guide, Fifth Edition

Supplementary

DHTML and CSS for the World Wide Web: Visual QuickStart Guide, Third Edition
How the Mac® Works, Millennium Edition

Overview

Sections

Dissecting a PC

Upgrading a PC

Exploring the Internet

Treasure Hunting

Building and Configuring a LAN and WLAN

Designing GIFs, JPEGs, and PNGs

Disinfecting a PC

Building Websites with XHTML

Enhancing Websites with CSS

Programming with Scratch

...

Overview

Workshops

Using a PC and the Course's Website

Mastering Windows

Mastering Mac OS

Swapfest

Tour of a NOC

Building a PC

(Teaching HILR Members to) Master the Internet

Computer Games

Digital Photos

Digital Videos

Enhancing Websites with Flash

Enhancing Websites with JavaScript

...

Overview

Problem Sets

Hardware

Hardware and Software

The Internet

Hardware, Software, and the Internet

Multimedia

Security

Website Development

Programming

...

Overview

Final Project

Overview

Grades

Problem Sets	40%
Exam 1	20%
Exam 2	20%
Final Project	20%

Overview

Website

http://www.fas.harvard.edu/~cscie1/

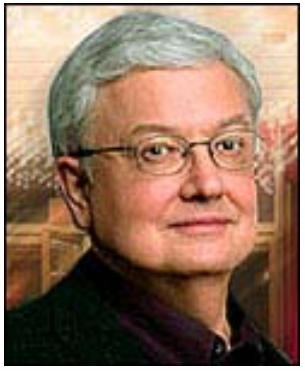
Overview

Staff

cscie1@fas.harvard.edu

Overview

Staff's Picks



Overview

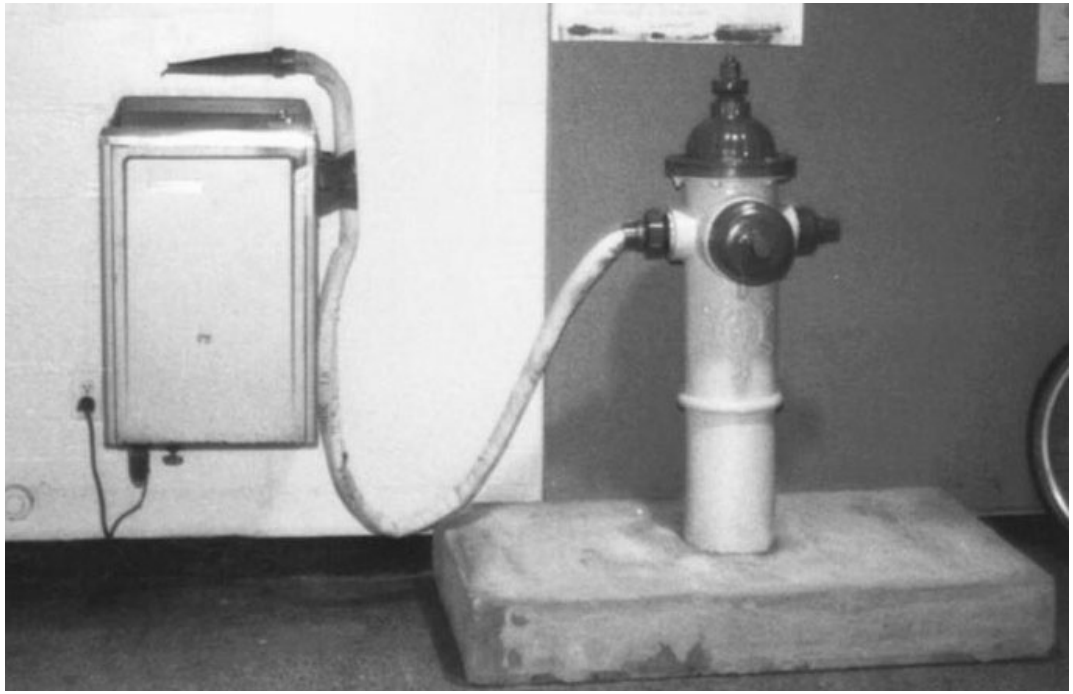
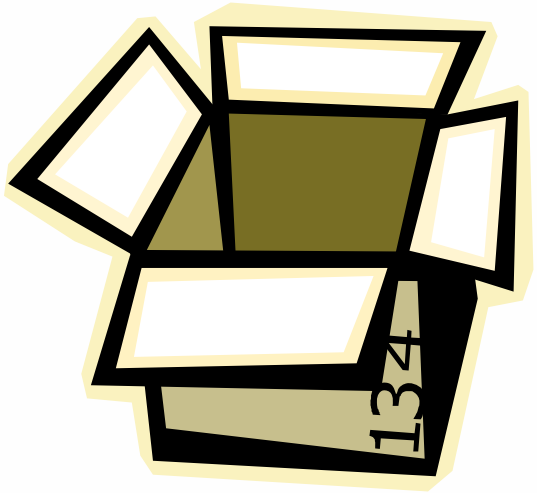


Image from http://hacks.mit.edu/Hacks/by_year/1991/fire_hydrant/.

The Not-Dumb Question Box

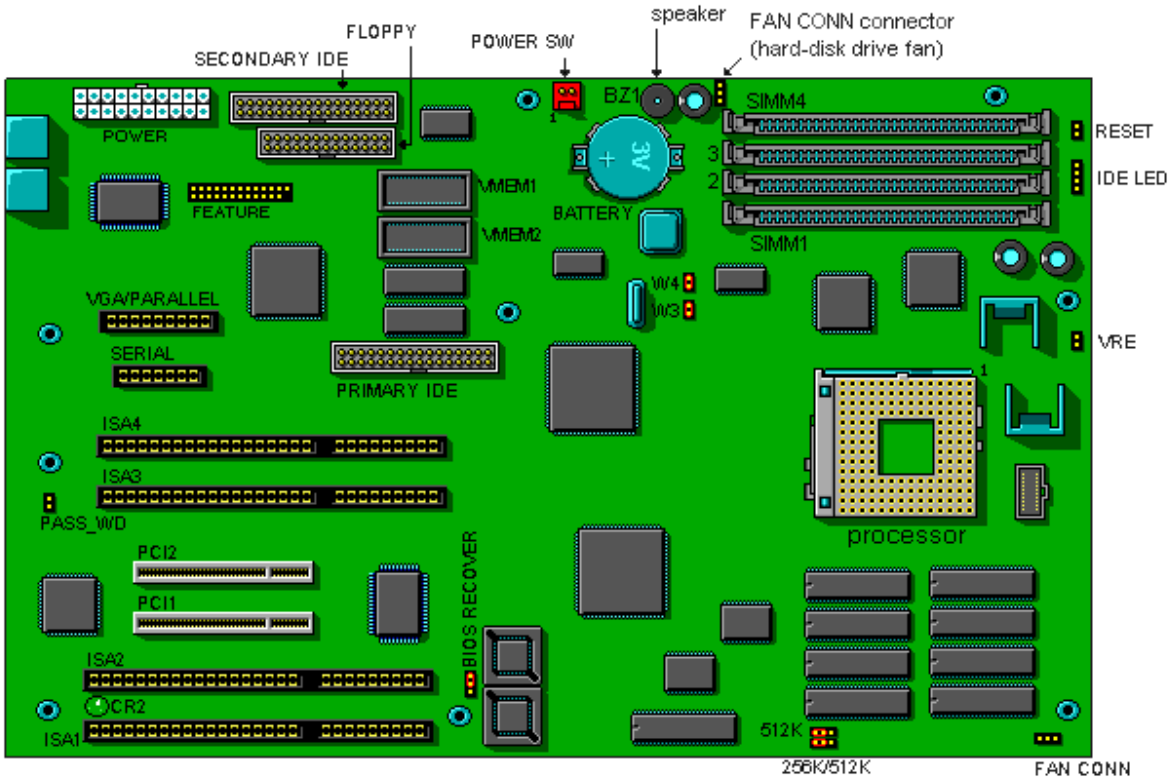
www.notdumbquestions.com



CPUs

Mobile Intel® Pentium® 4 Processor - M
Micro Flip Chip Pin Grid Array

Motherboards



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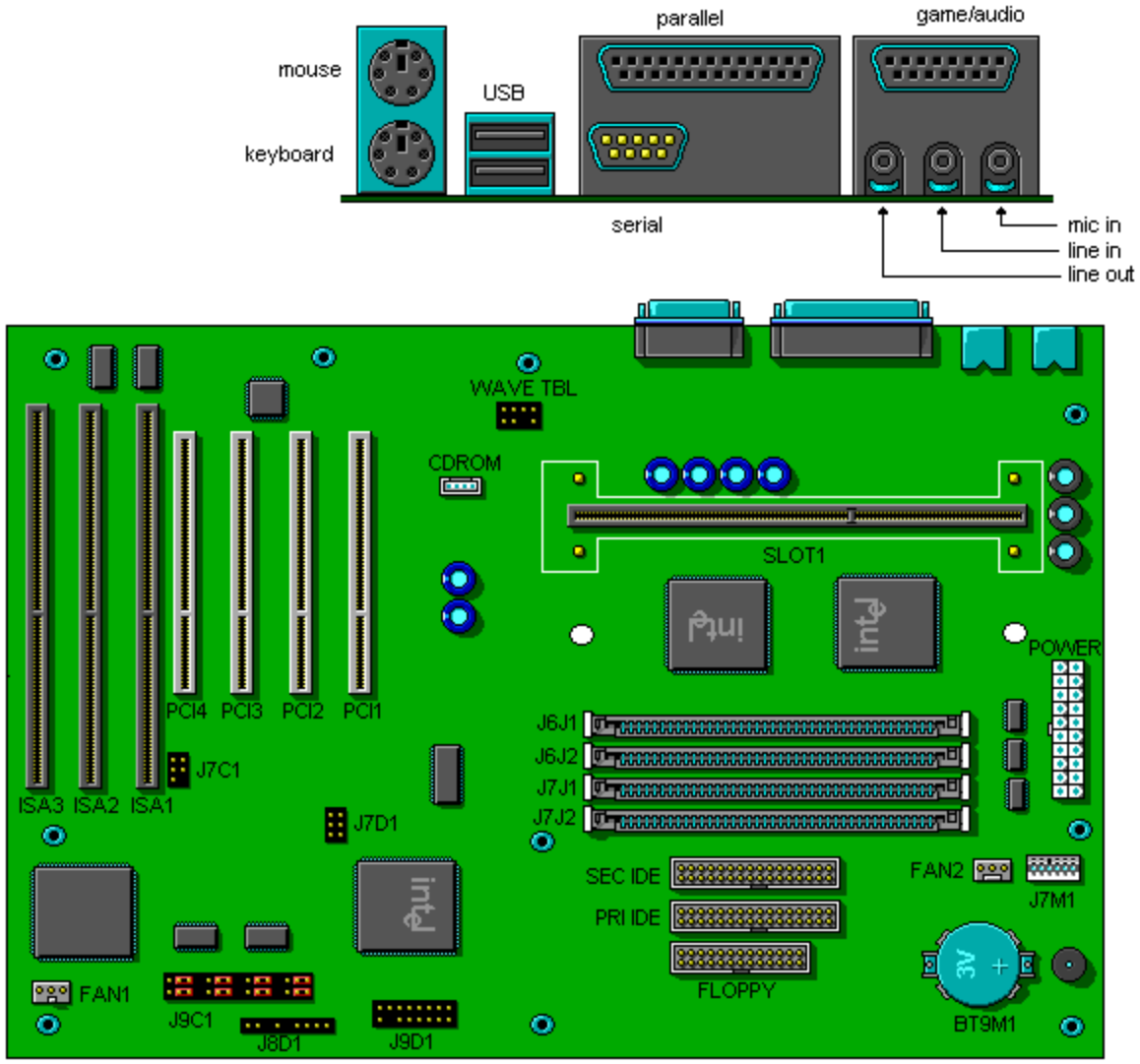
Motherboards



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Memory

ROM

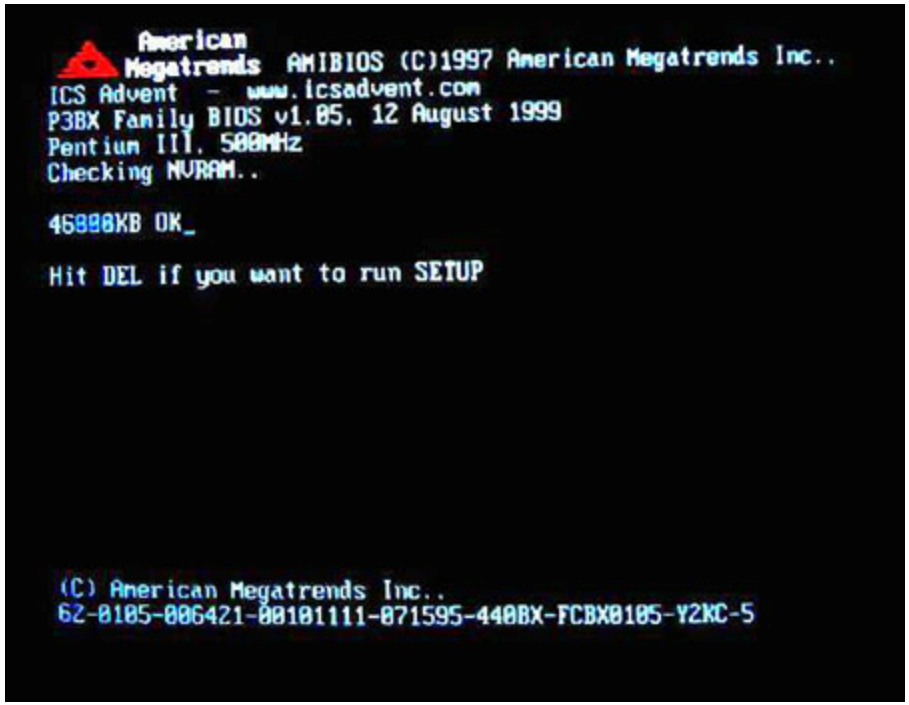
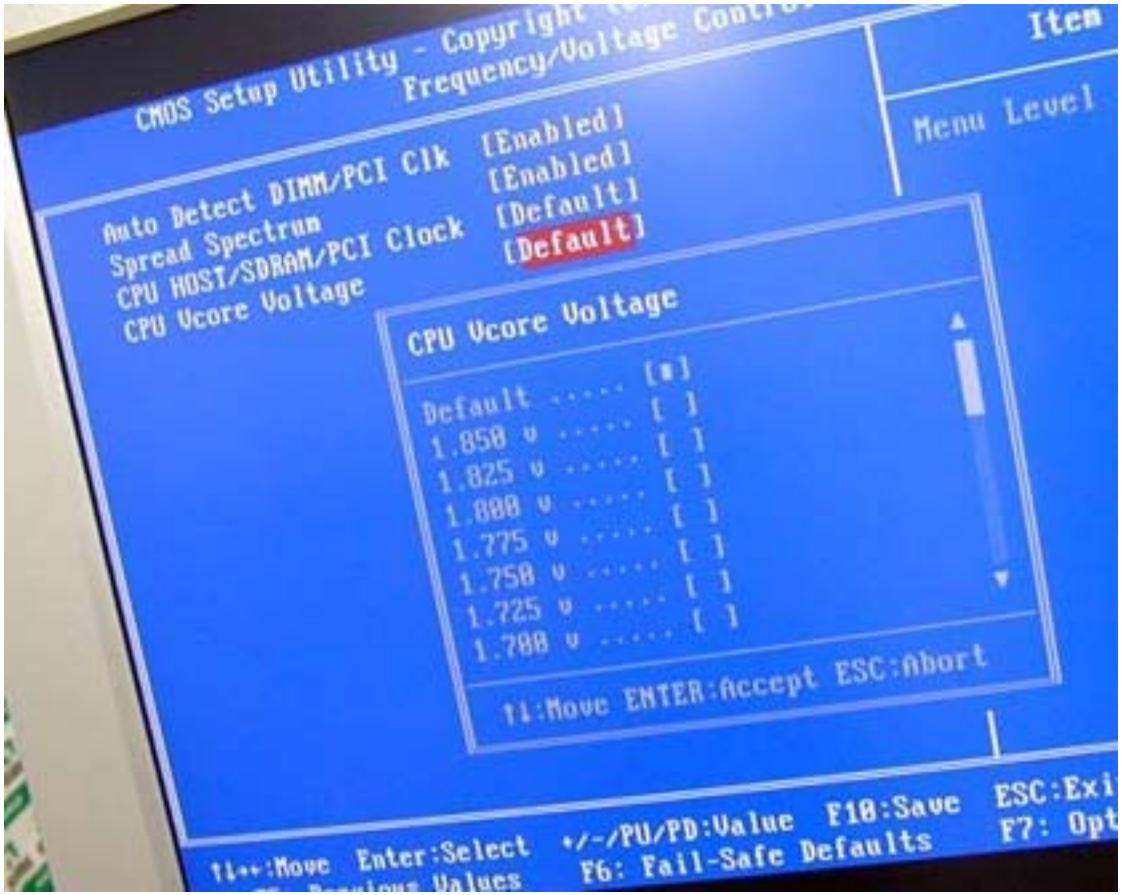


Image from http://www.kontron.com/support/bios_id.cfm, copyright © Kontron.com.

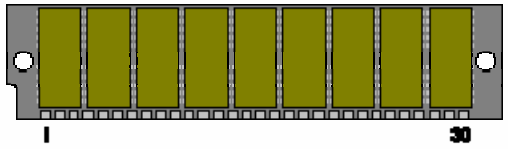
Memory

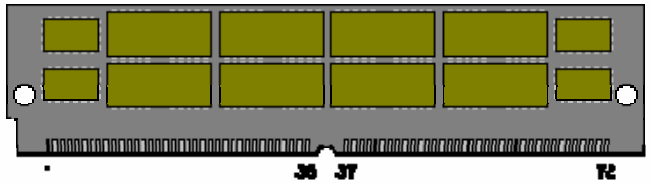
ROM

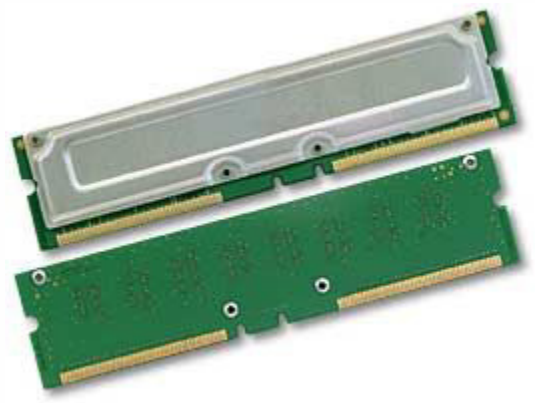


Memory

RAM







Memory

Level-1 and Level-2 Cache

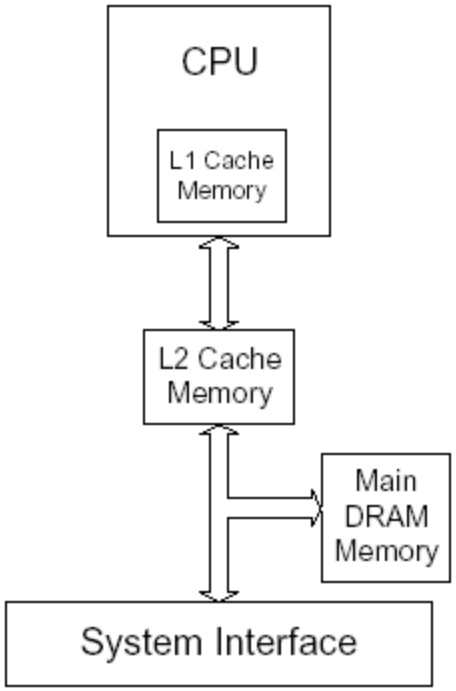


Figure 3-1 Pentium® Processor with L2 cache

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