INTRODUCTION TO SOFTWARE DEVELOPMENT

Week 2 Day 1

Led by: Emily Crose

for

Oakland University

PREVIOUS SESSION QUESTIONS

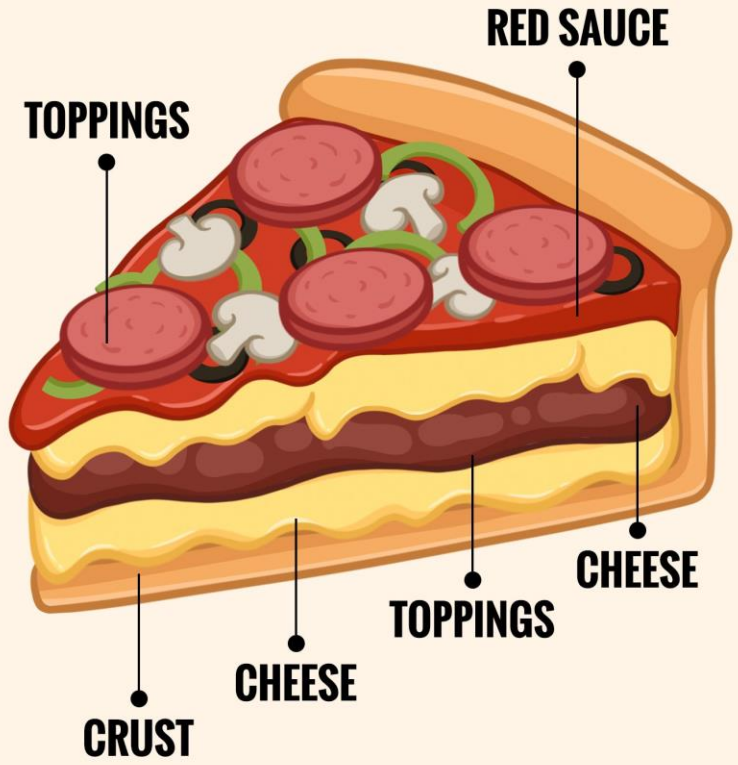
TERMS TO LISTEN FOR

- Cache
  - A small portion of RAM set aside for temporary storage for frequently accessed data
- Process Register
  - A quickly accessible location available to a computer processor
- Heap & Stack
  - Memory management methods

APPLICATIONS & OPERATING SYSTEMS

OPERATING SYSTEMS OVERVIEW

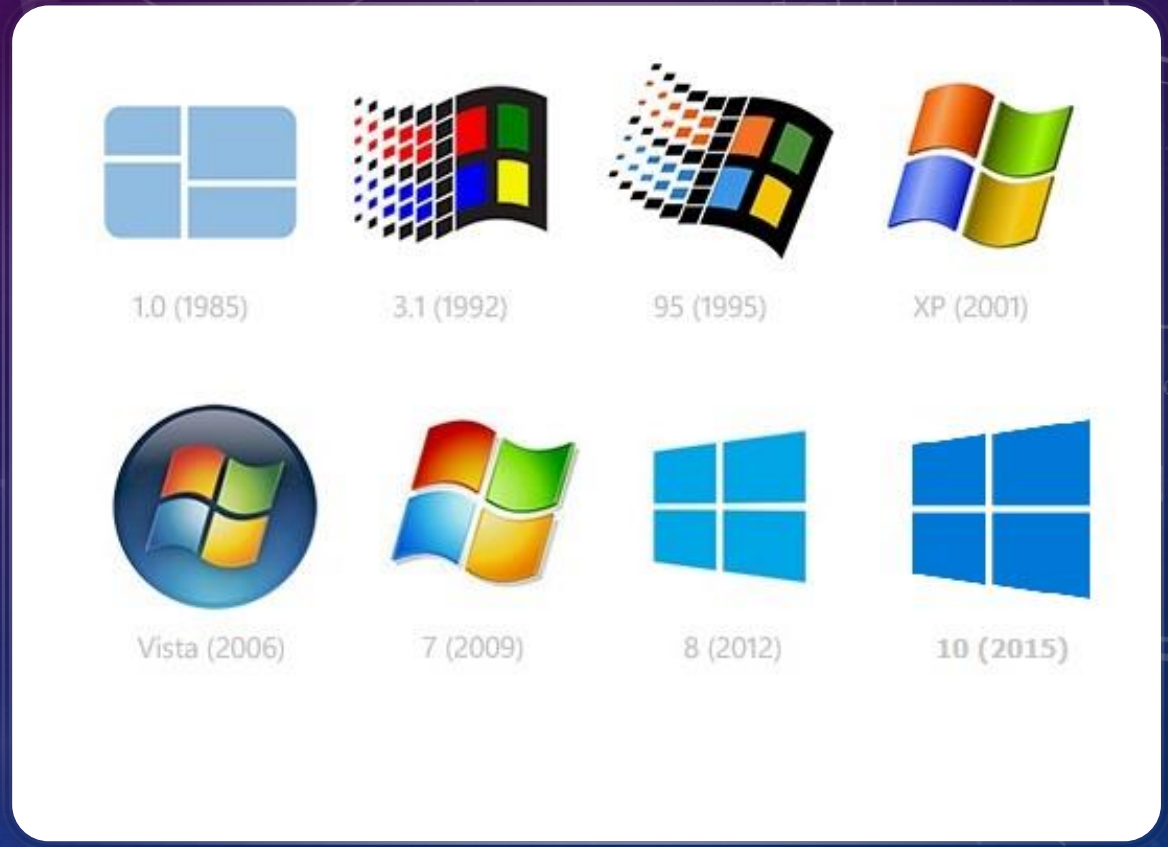
DEEP DISH PIZZA

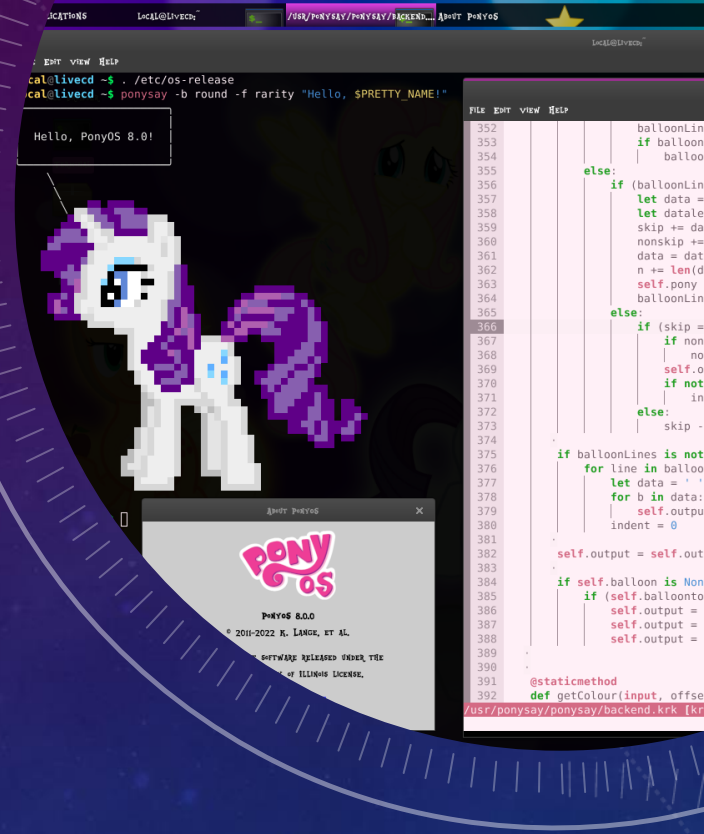


Operating System

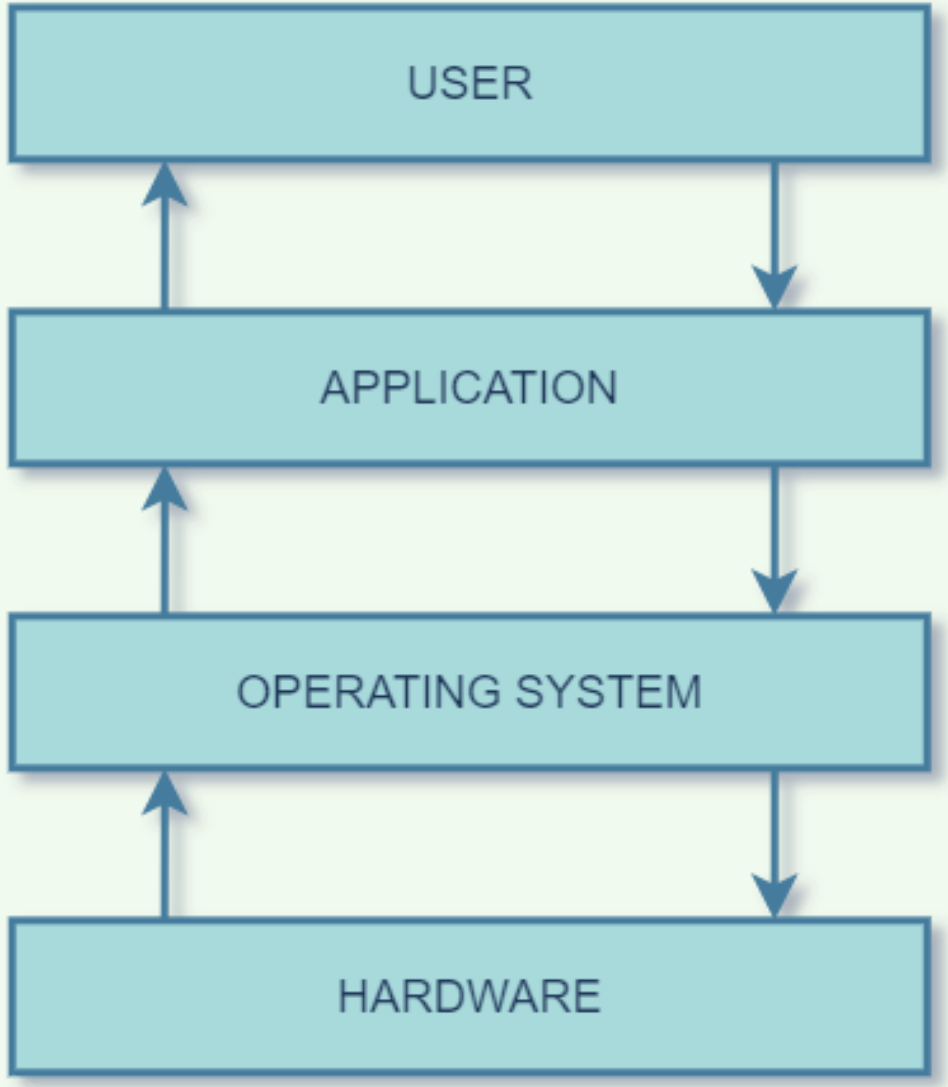
WELL-KNOWN OPERATING SYSTEMS

OLD & OUT OF SUPPORT WINDOWS VERSIONS

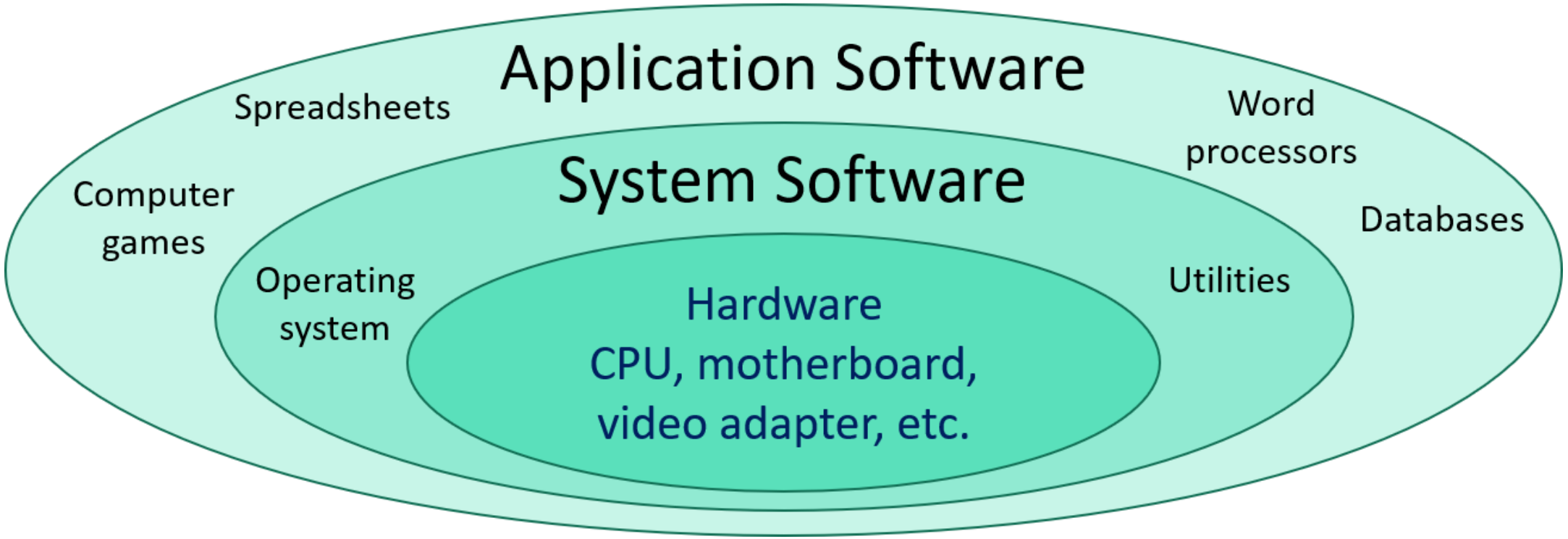




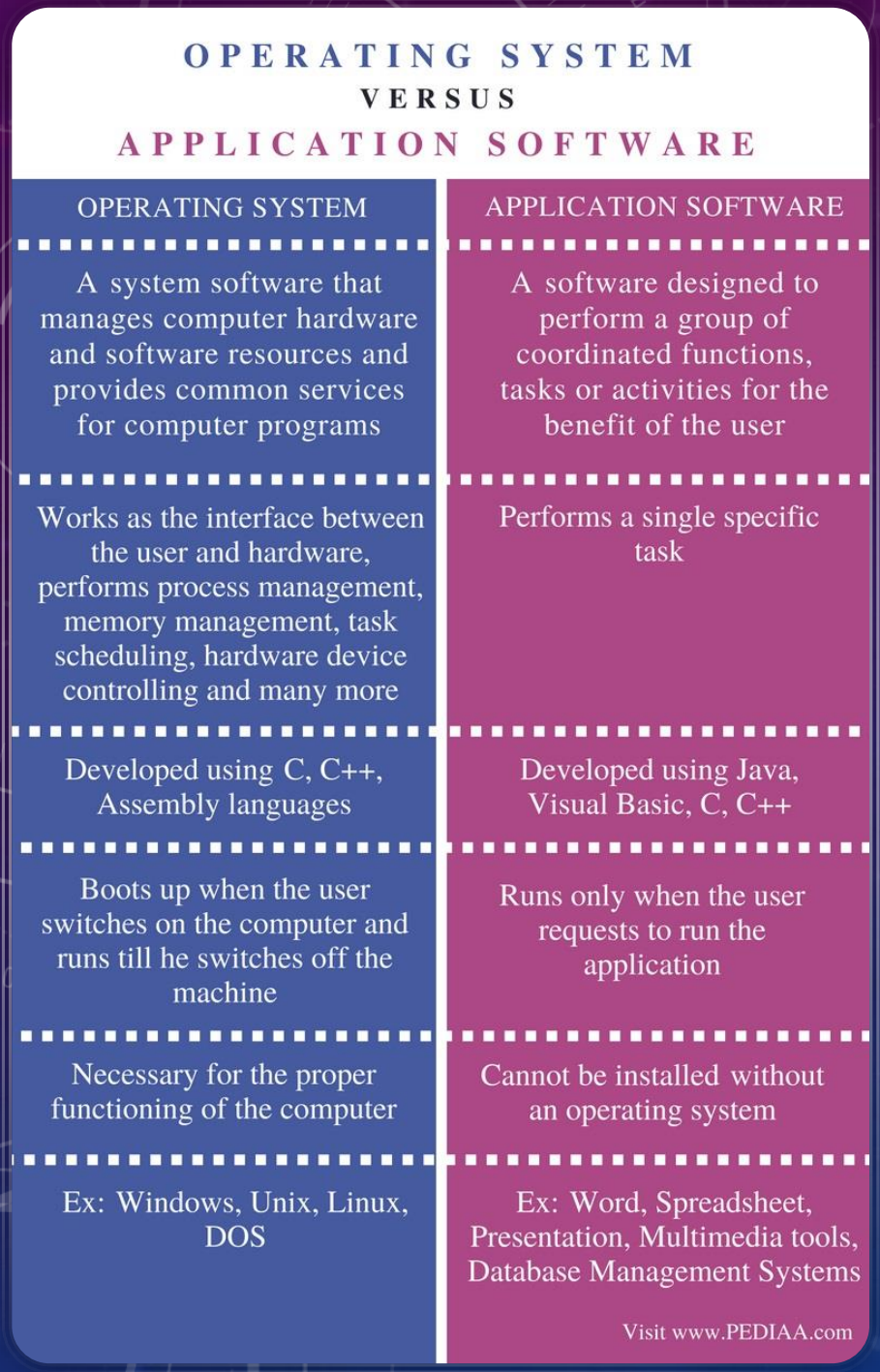
FUNNY LINUX VARIANTS



OPERATING SYSTEMS VS APPLICATIONS


Application Software
Spreadsheets
Word processors
Computer games
System Software
Databases
Operating system
Utilities
Hardware
CPU, motherboard, video adapter, etc.

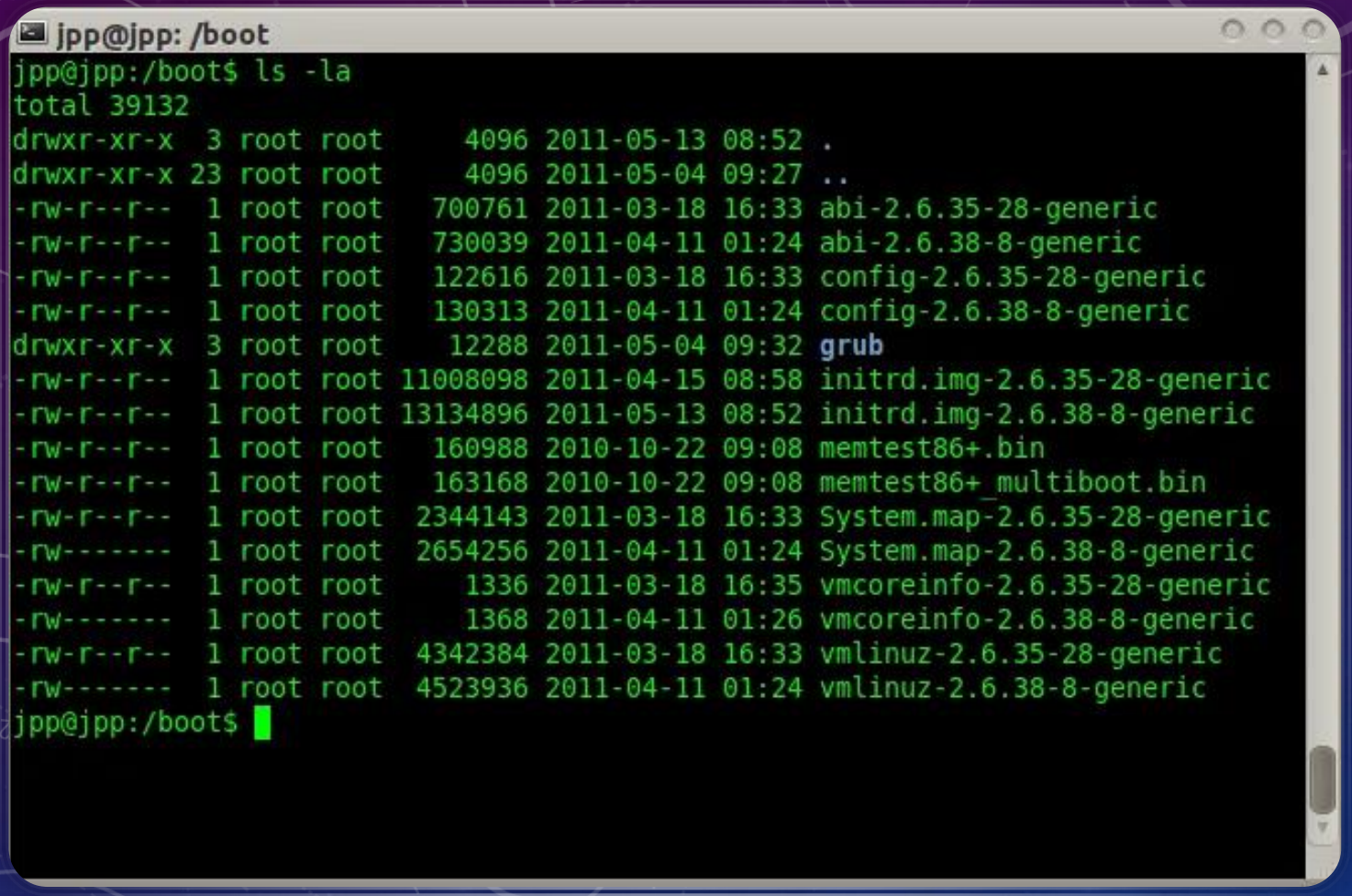
OS & APP DIFFERENCES



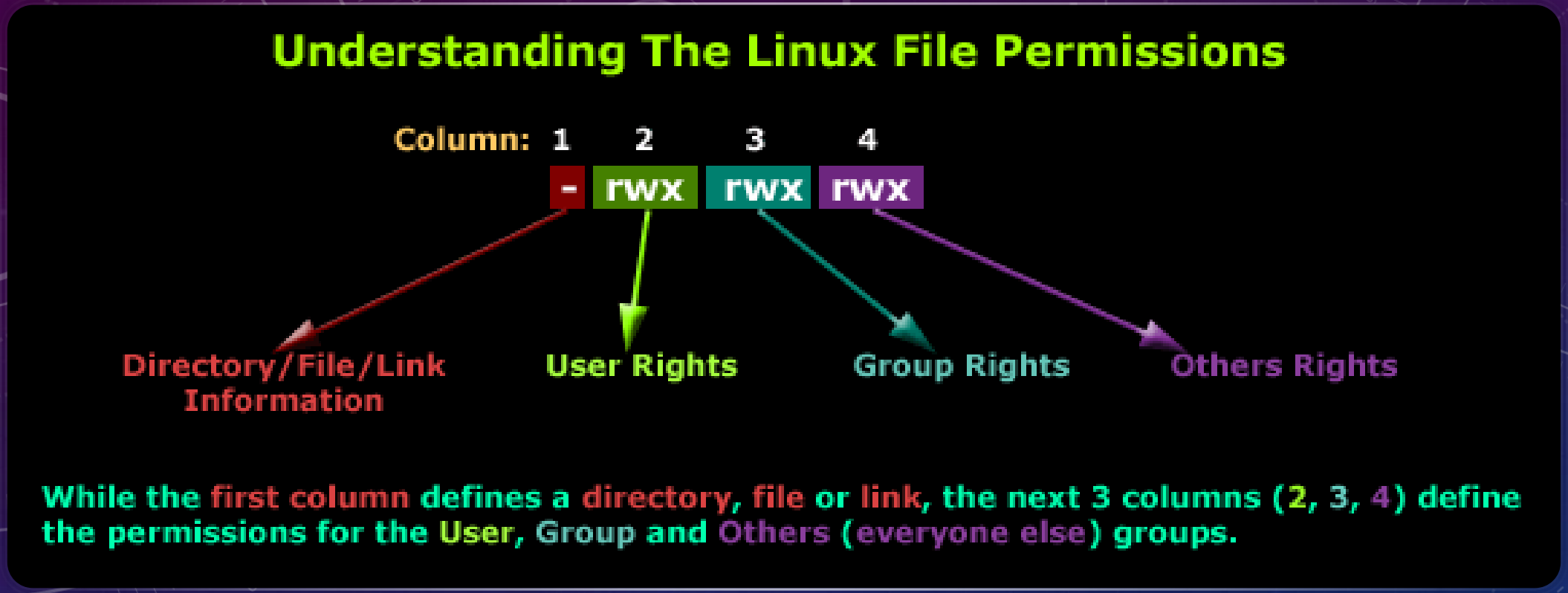
PERMISSIONS

WHAT DO PERMISSIONS DO?

- Allow read, write, and execute permissions for files and folders
- Can be changed with those who have rights to change file and folder permissions levels
- Can be customized for users, groups, and “others”

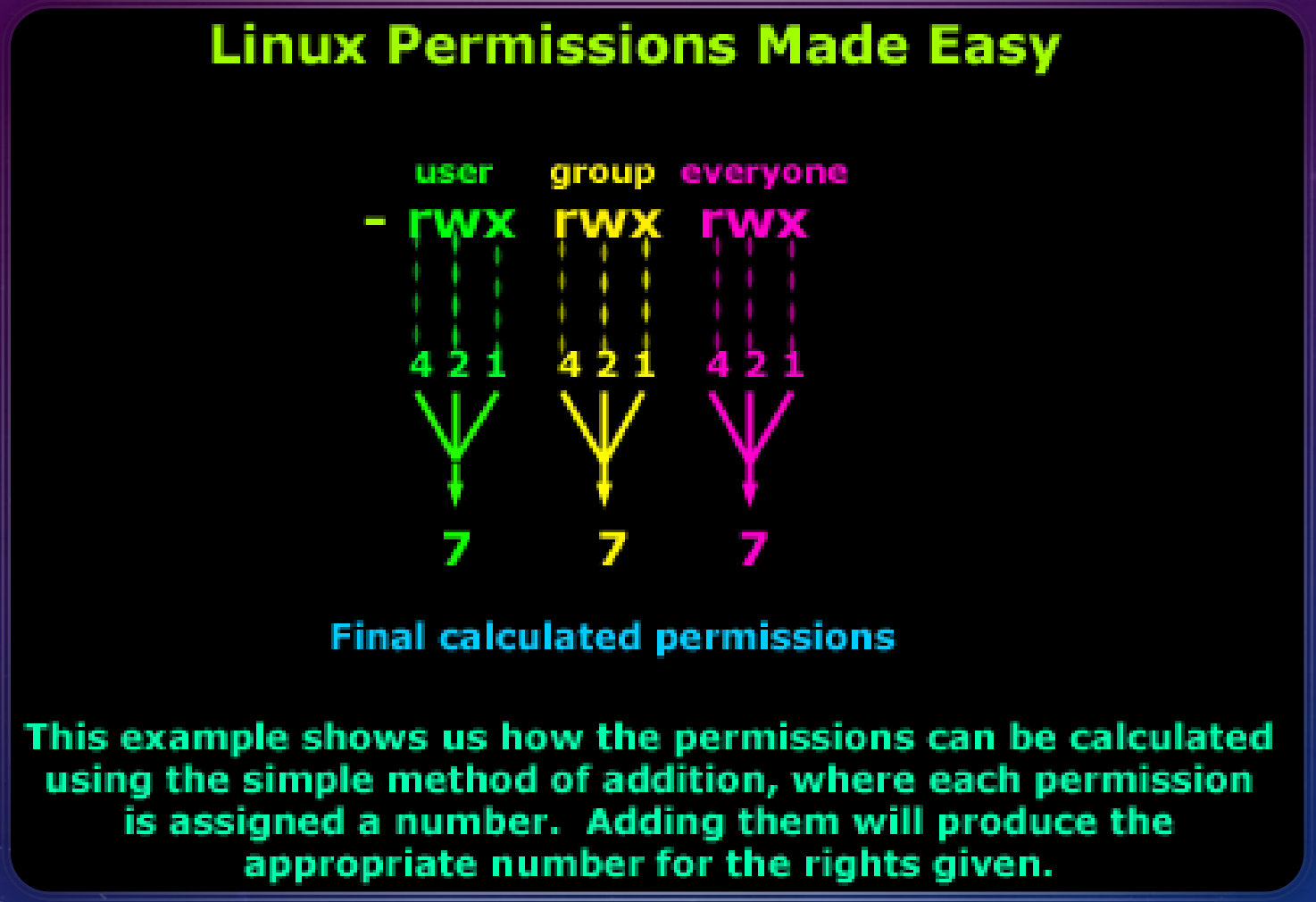


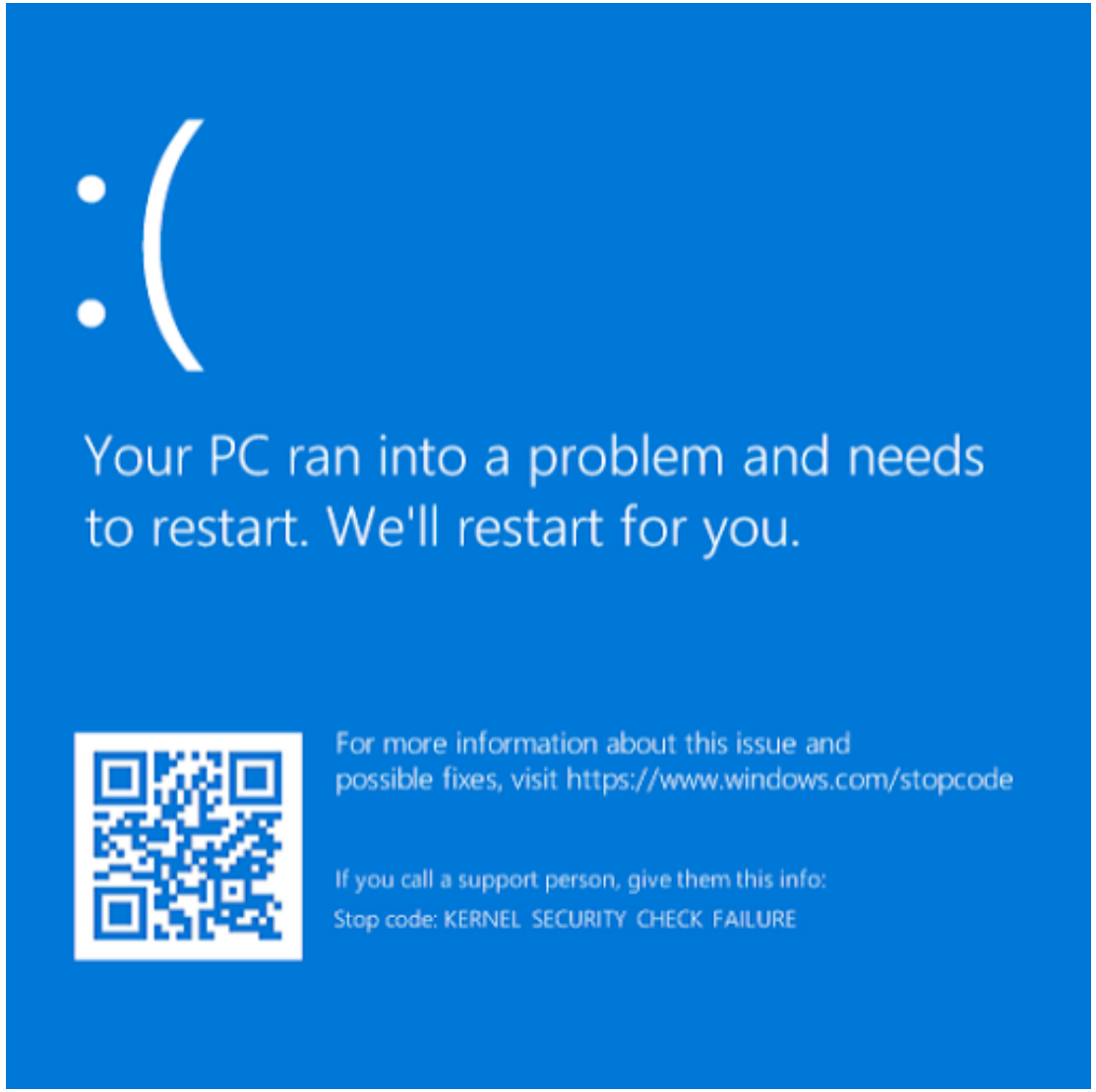
LINUX PERMISSIONS IN PRACTICE



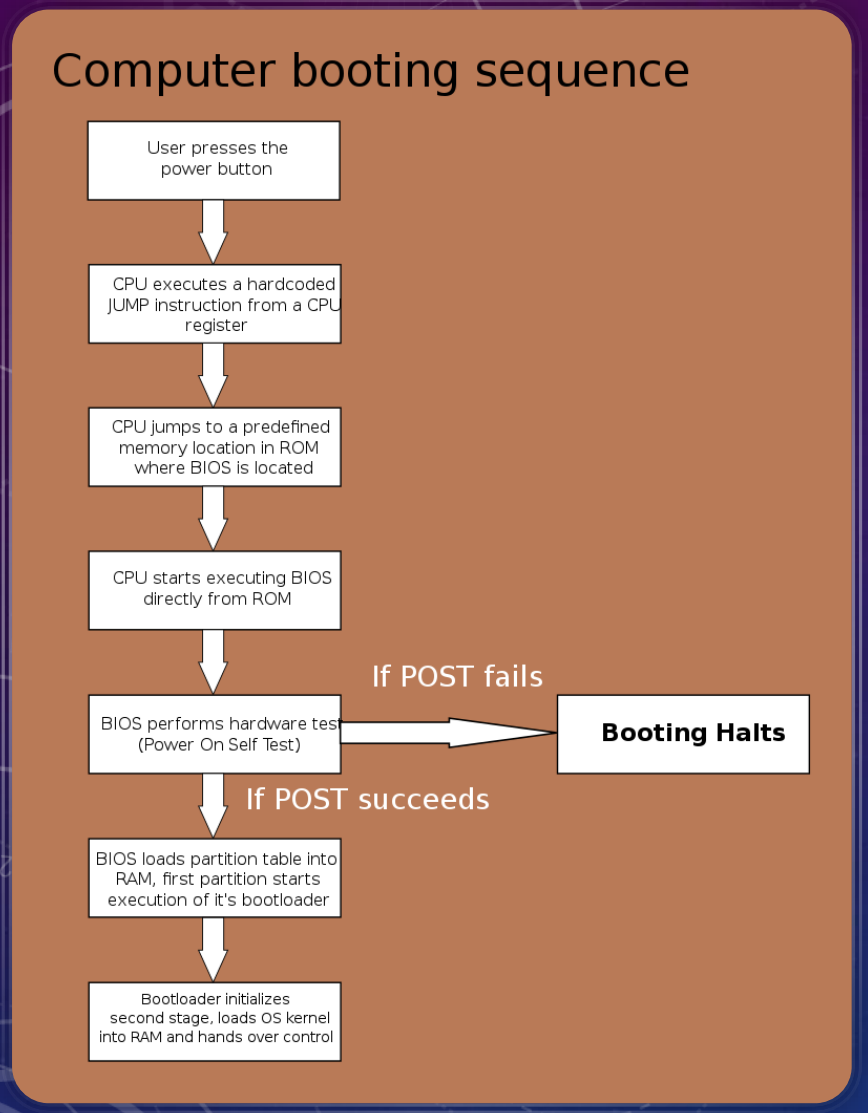
UNDERSTANDING PERMISSIONS

LINUX PERMISSIONS

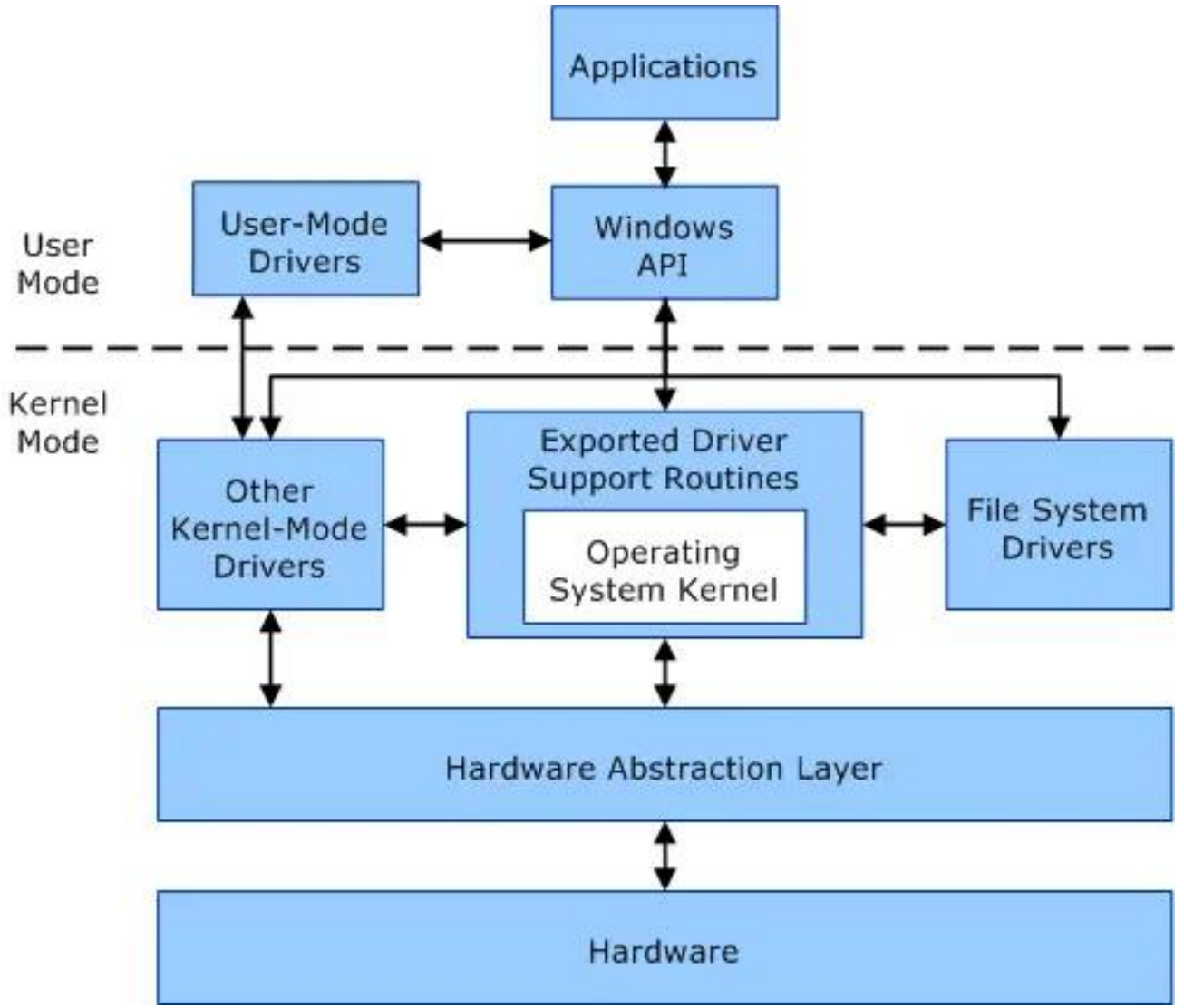


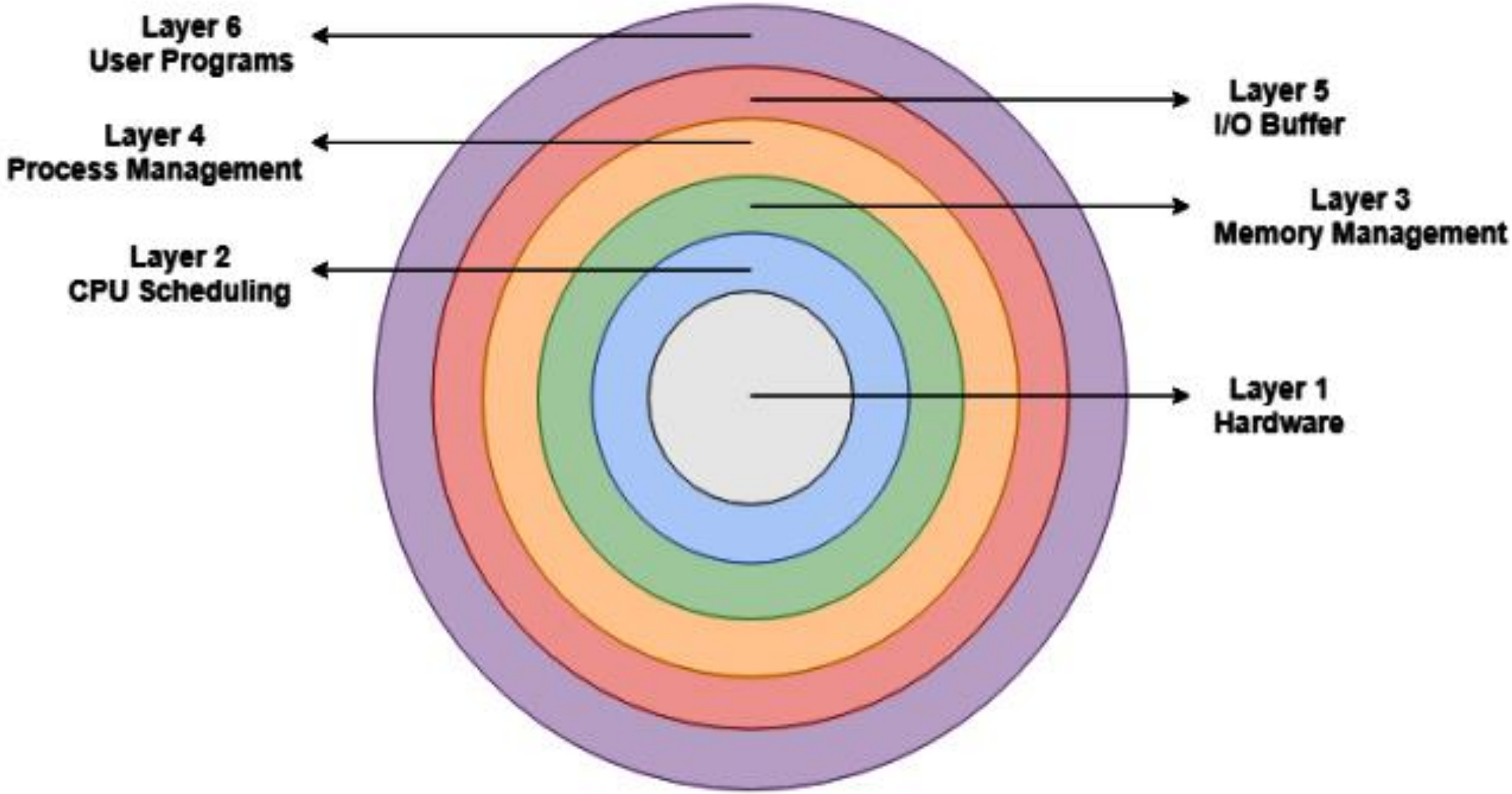

:(
Your PC ran into a problem and needs to restart. We'll restart for you.
For more information about this issue and possible fixes, visit https://www.windows.com/stopcode
If you call a support person, give them this info:
Stop code: KERNEL SECURITY CHECK FAILURE

POWER-ON SELF-TEST (POST)

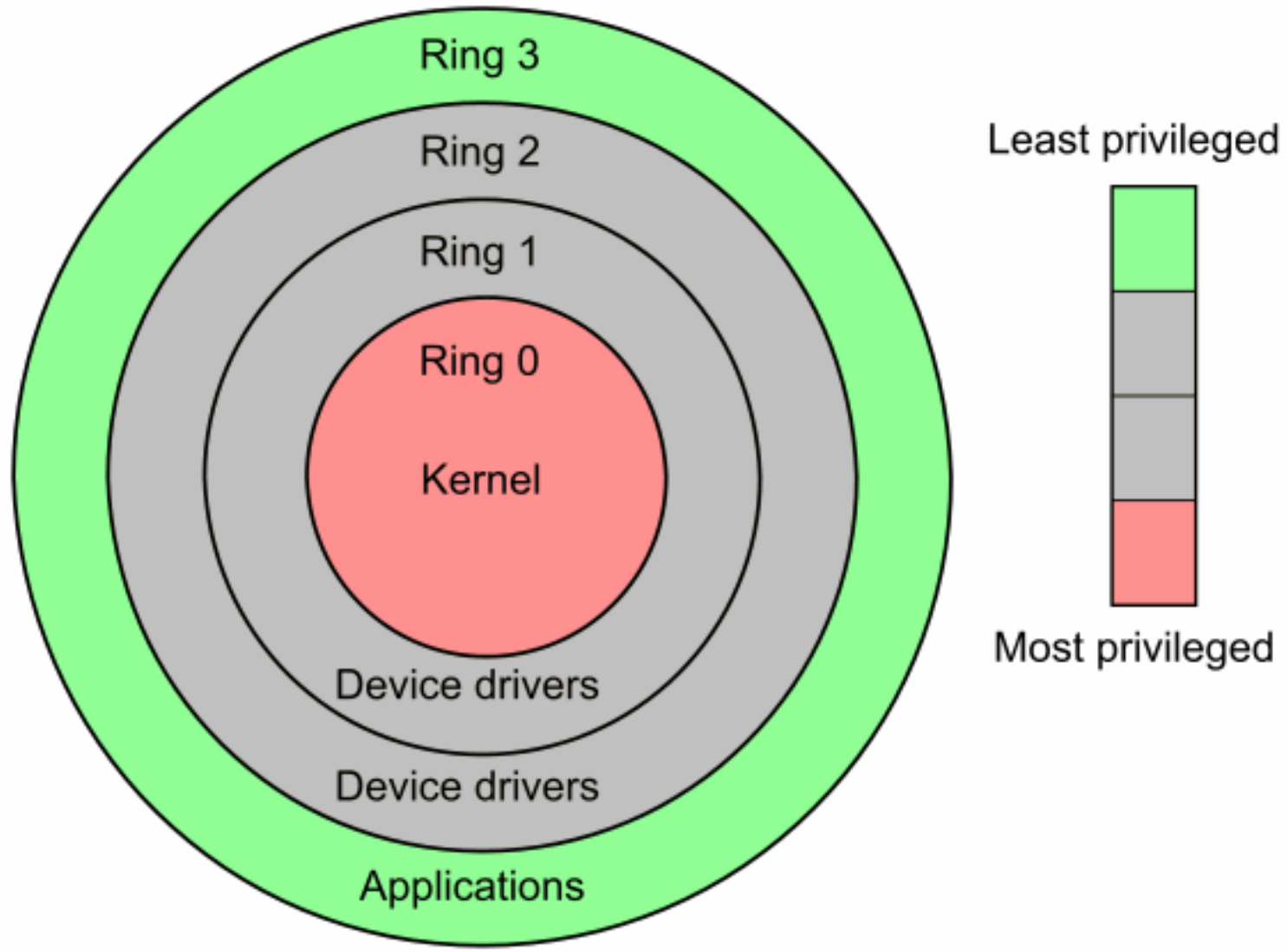


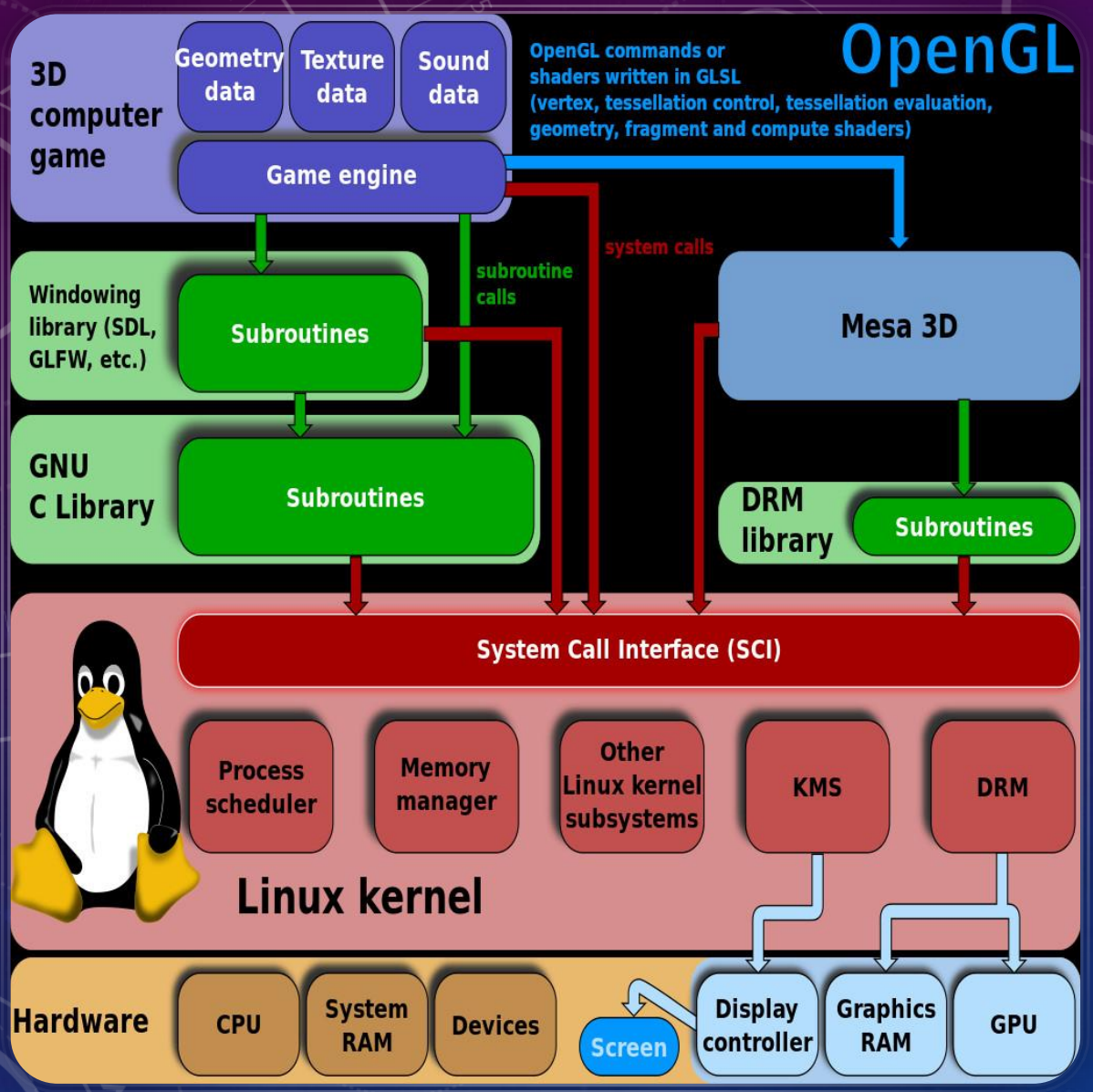
THE KERNEL


Applications
User-Mode Drivers
Windows API
User Mode
Kernel Mode
Other Kernel-Mode Drivers
Exported Driver Support Routines
Operating System Kernel
File System Drivers
Hardware Abstraction Layer
Hardware



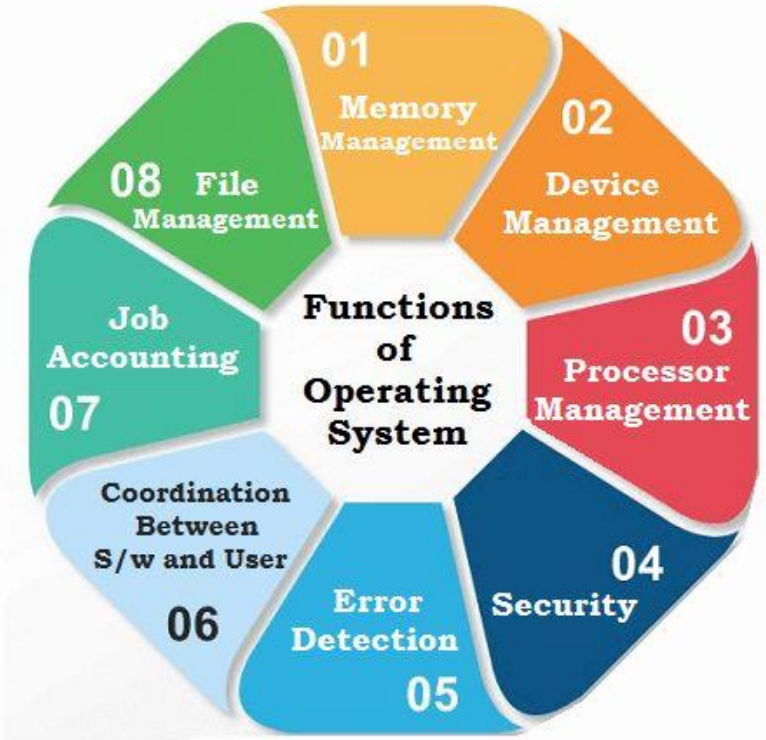
Layers of operating system


Ring 3
Ring 2
Ring 1
Ring 0
Kernel
Device drivers
Device drivers
Applications
Least privileged
Most privileged



KERNEL OPERATION

OPERATING SYSTEM SUPPORT



10 MINUTE BREAK

APPLICATIONS

TYPES OF APPLICATIONS

Mobile applications

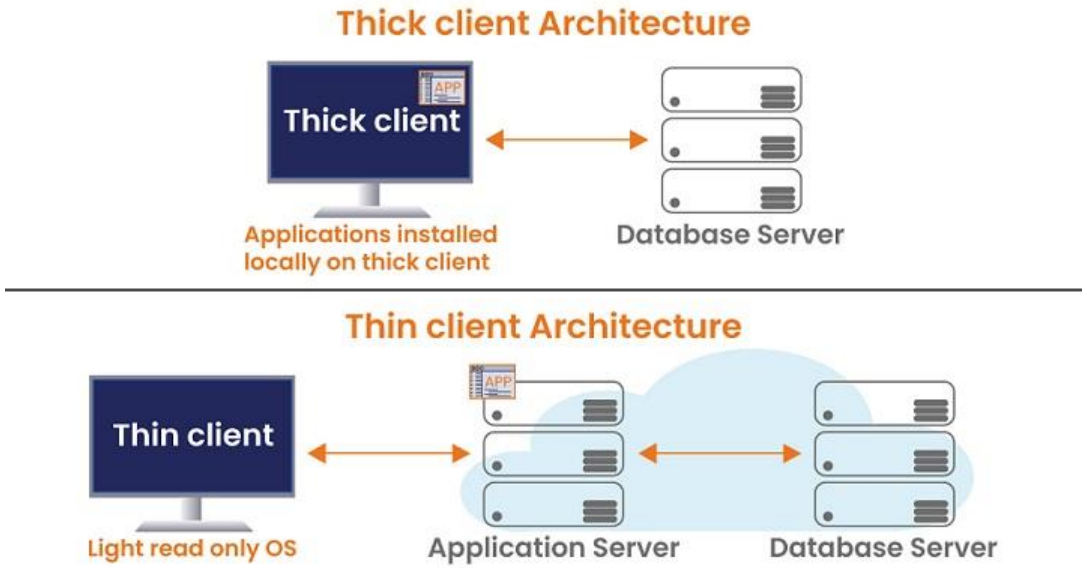
Desktop applications

Embedded applications

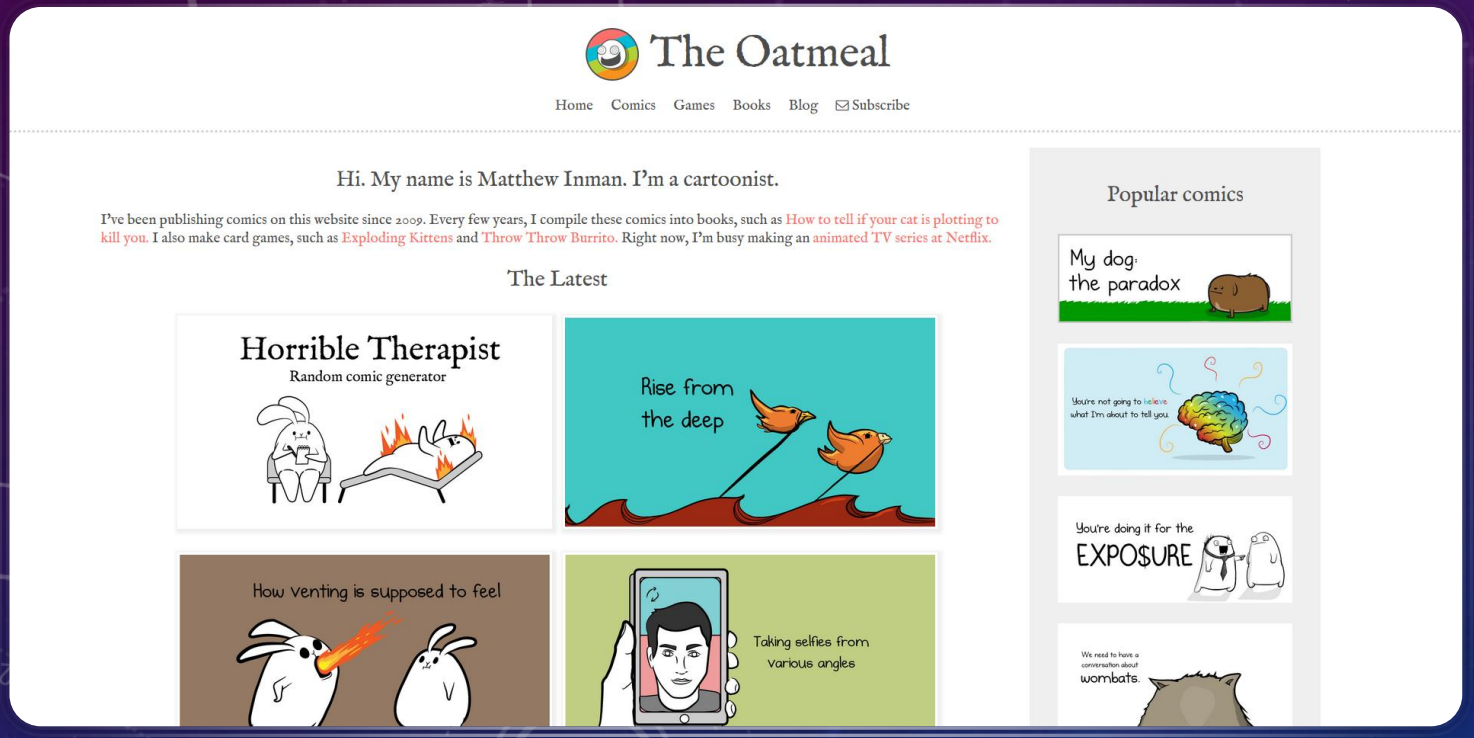
Web applications

DESKTOP APPLICATIONS

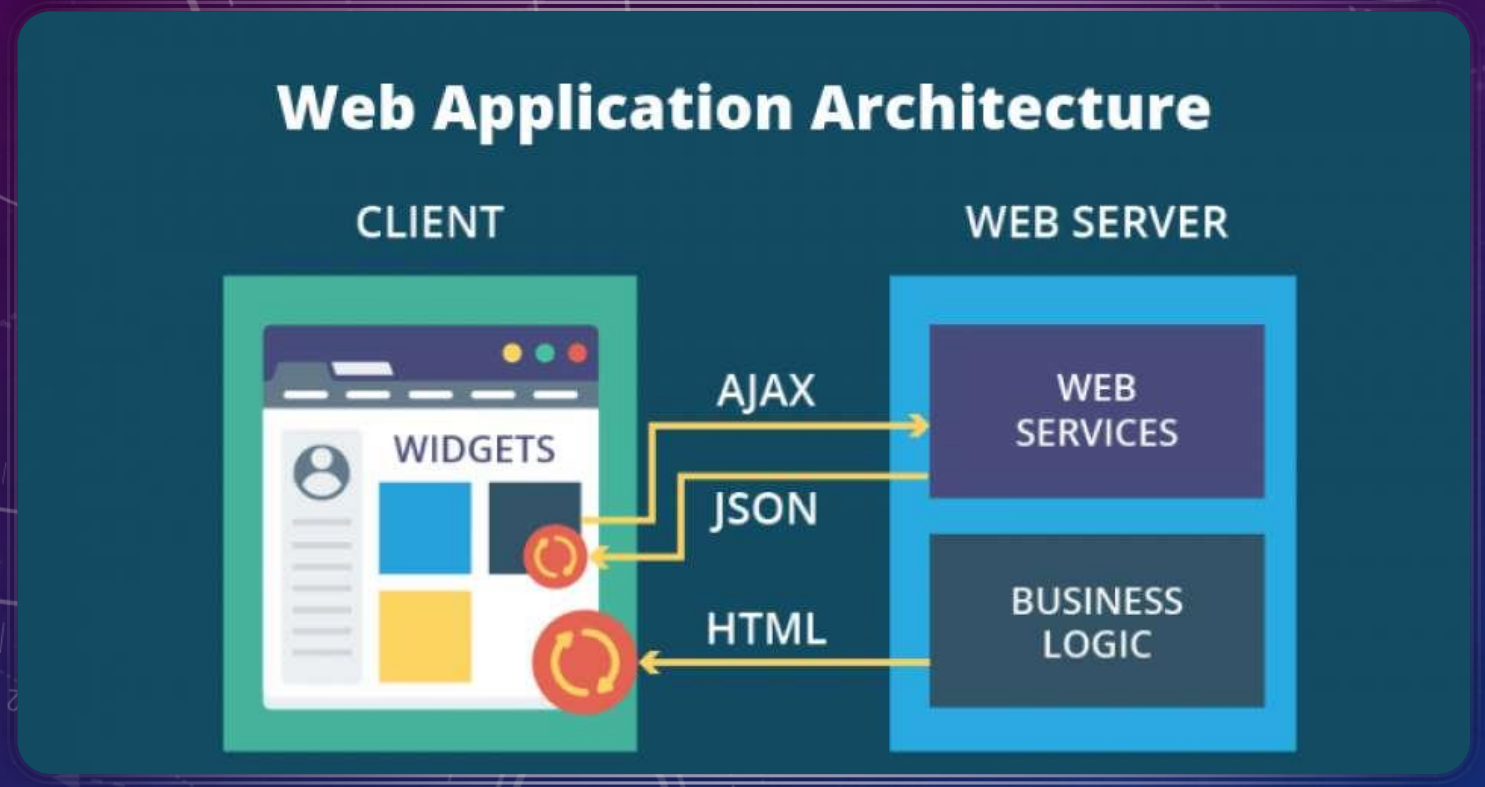
“THIN” CLIENT VS “THICK” CLIENT



MOBILE APPLICATIONS

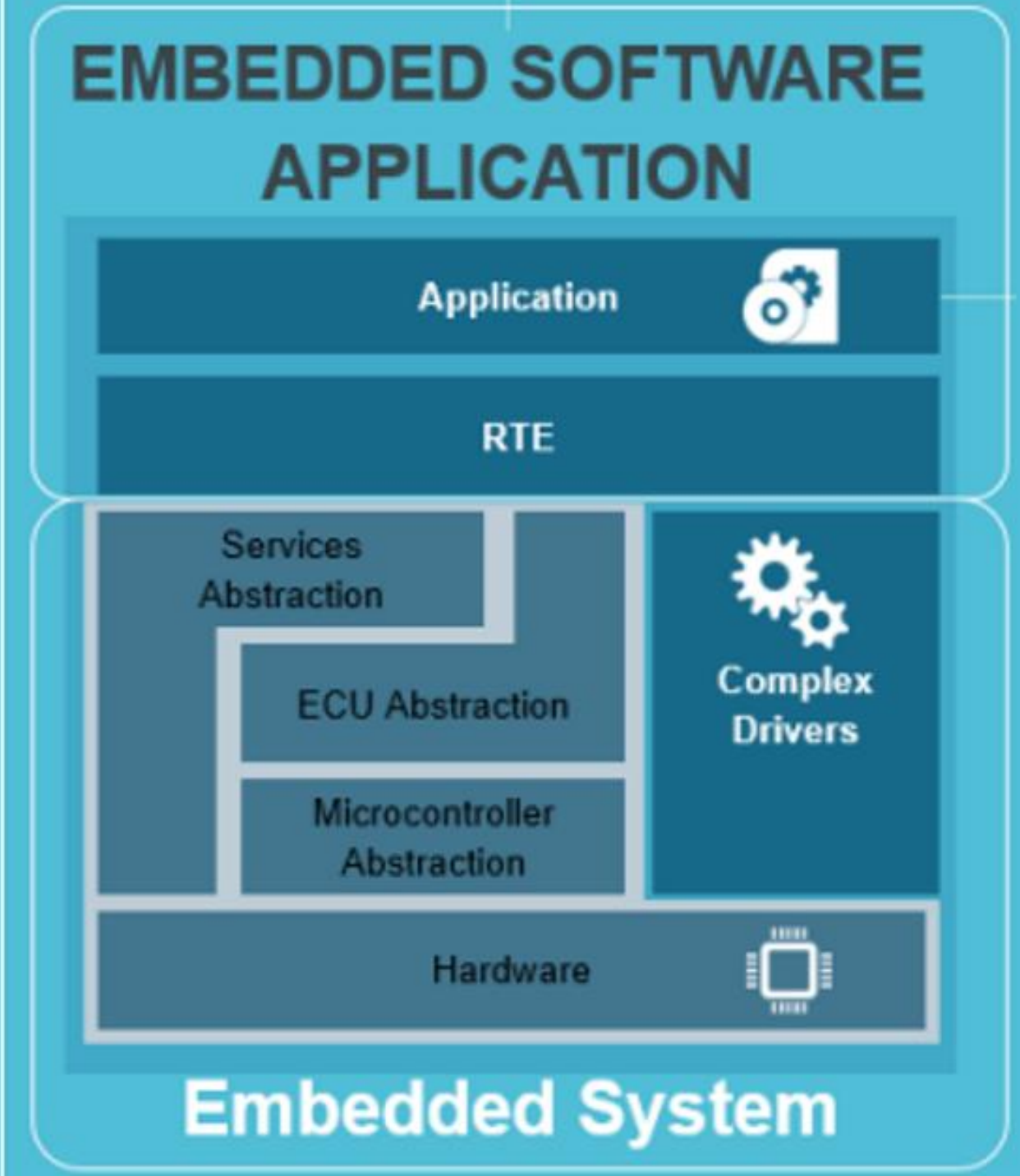

The Oatmeal
Home Comics Games Books Blog Subscribe
Hi. My name is Matthew Inman. I'm a cartoonist.
I've been publishing comics on this website since 2009. Every few years, I compile these comics into books, such as How to tell if your cat is plotting to kill you. I also make card games, such as Exploding Kittens and Throw Throw Burrito. Right now, I'm busy making an animated TV series at Netflix.
The Latest
Horrible Therapist
Random comic generator
Rise from the deep
How venting is supposed to feel
Taking selfies from various angles
Popular comics
My dog: the paradox
You're not going to believe what I'm about to tell you
You're doing it for the EXPOSURE
We need to have a conversation about wombats.

WEBSITE



WEB APPLICATIONS

EMBEDDED SOFTWARE & SYSTEMS

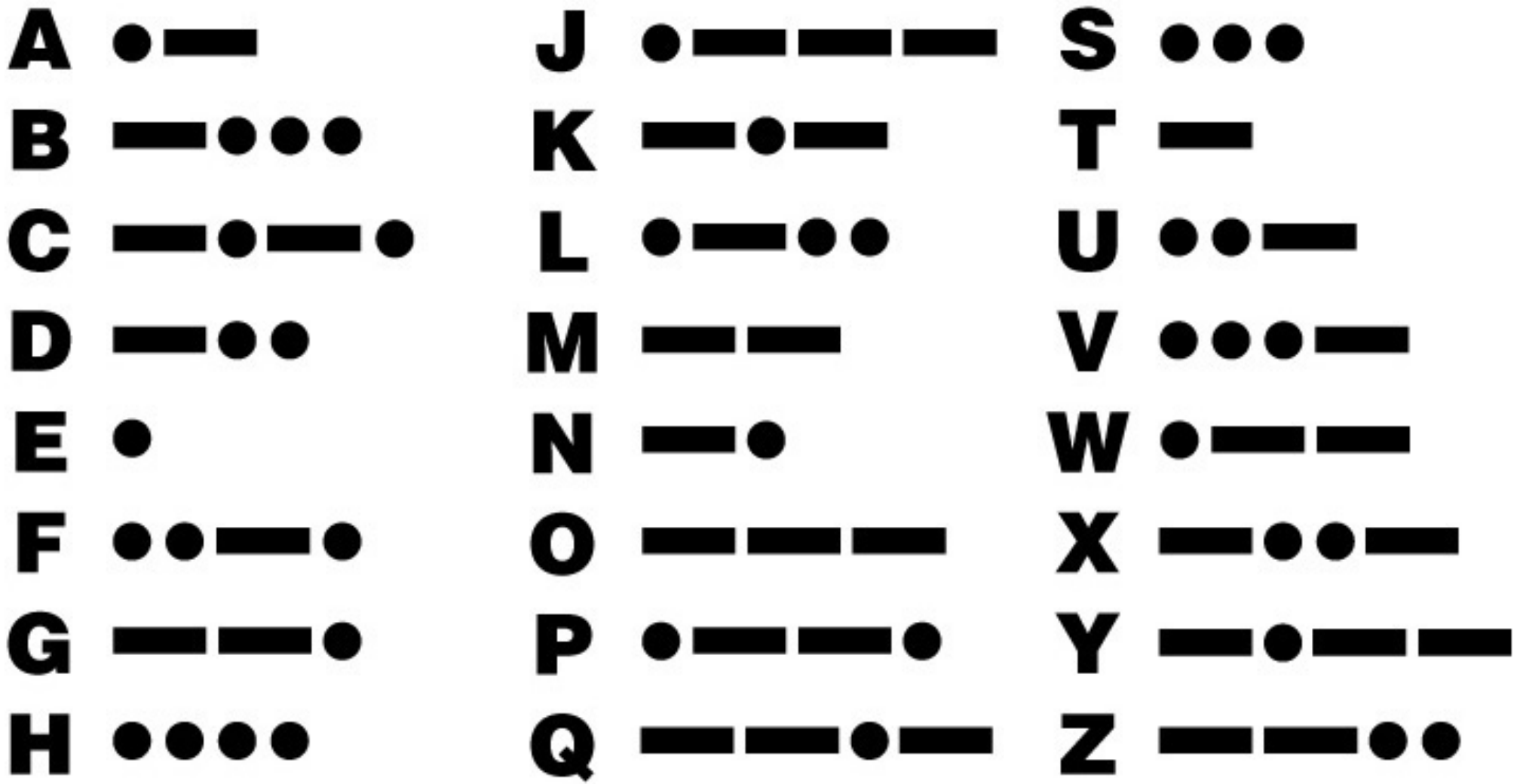

EMBEDDED SOFTWARE APPLICATION
Application
RTE
Services Abstraction
ECU Abstraction
Microcontroller Abstraction
Complex Drivers
Hardware
Embedded System

WHERE DOES IOT FIT?

- What do we know about IoT?
  - Inside of consumer electronics
    - Embedded applications?
- Can IoT be more than one category?

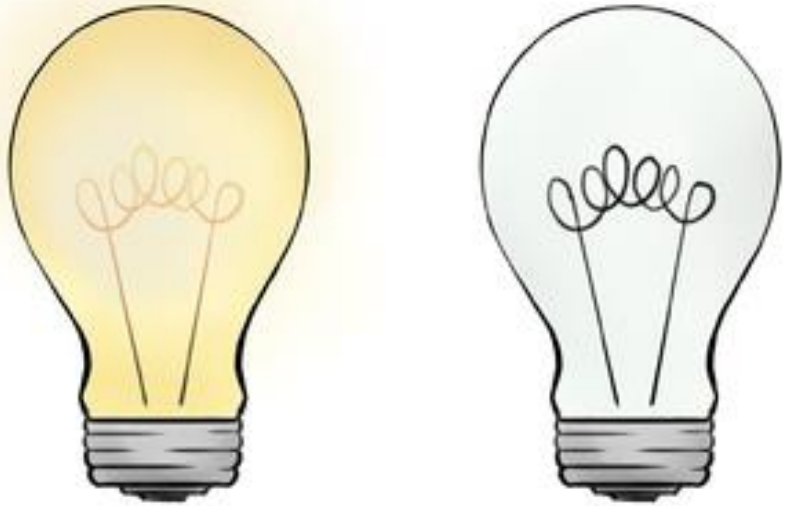
10 MINUTE BREAK


BINARY


A ●—
B —●●●
C —●—●
D —●●
E ●
F ●●—●
G ——●
H ●●●●
J ●———
K —●—
L ●—●●
M ——
N —●
O ———
P ●——●
Q ——●—
S ●●●
T —
U ●●—
V ●●●—
W ●——
X —●●—
Y —●——
Z ——●●


BINARY
COMMUNICATION
SOFTWARE
DEVELOPERS
TELEGRAPH
OPERATORS
imgflip.com

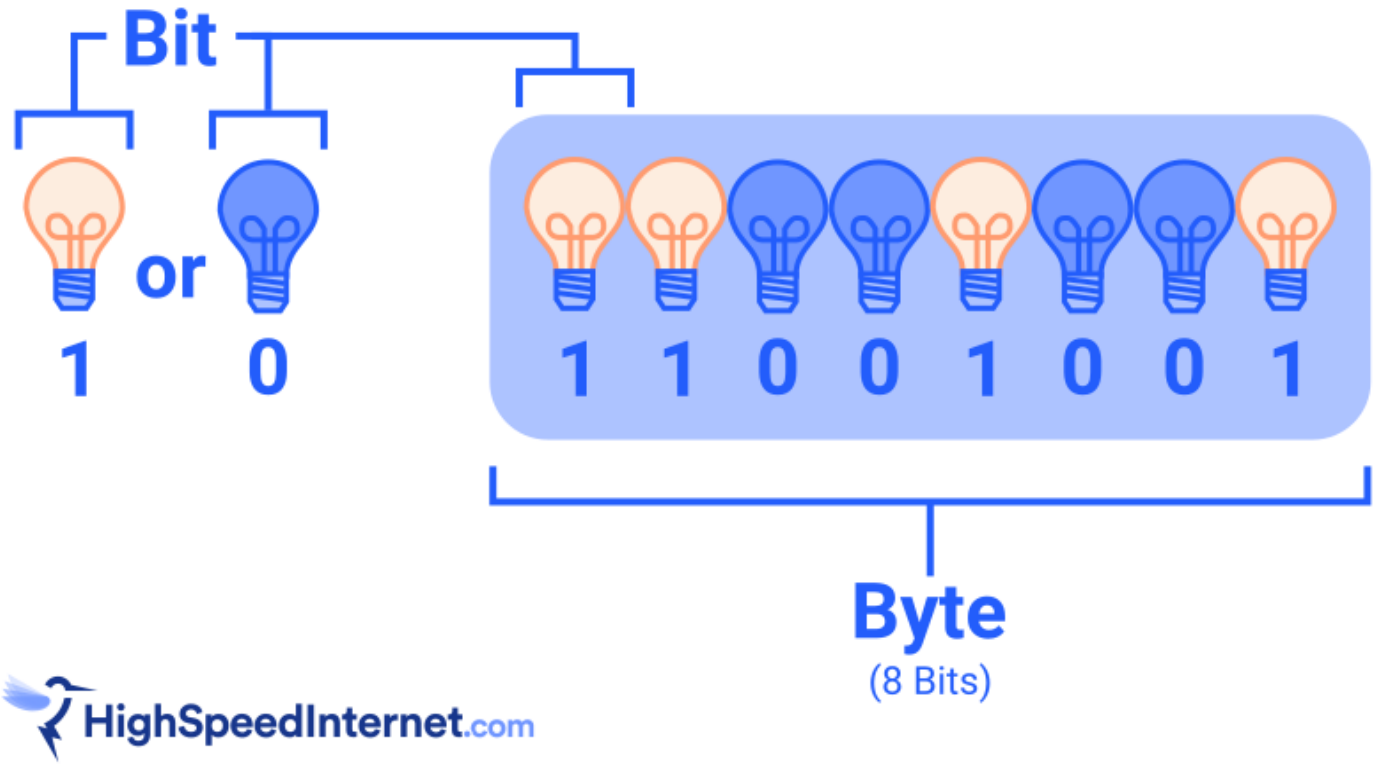
BIT

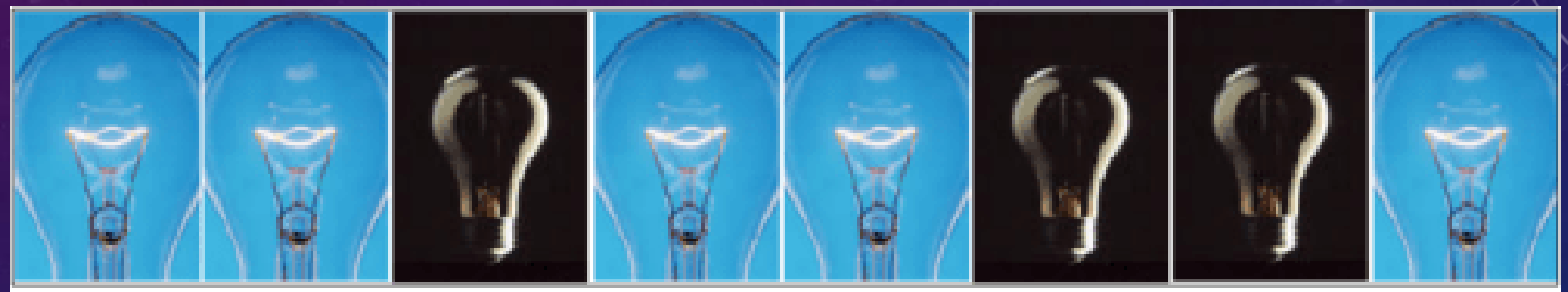


1

0

BITS & BYTES

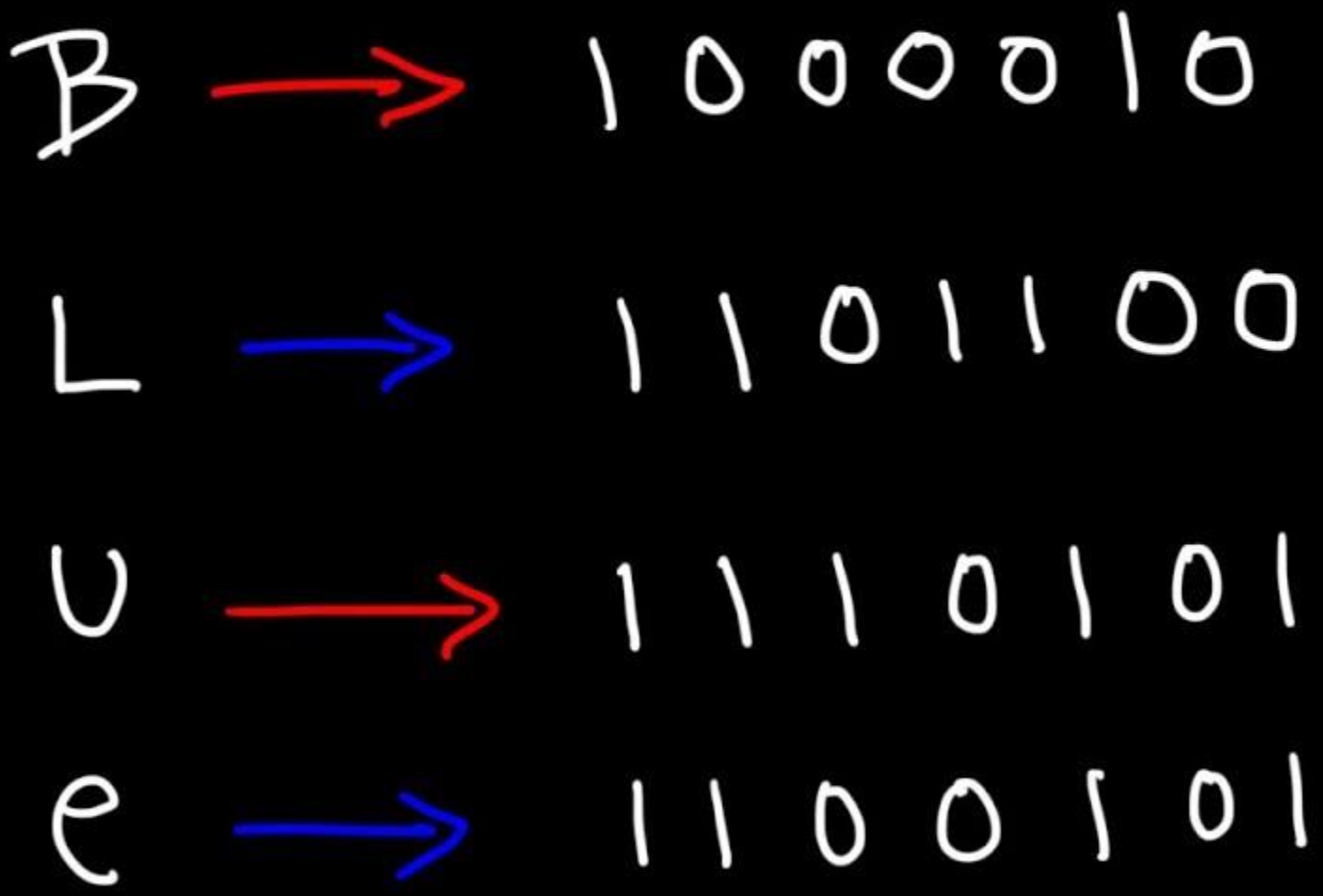




128	64	32	16	8	4	2	1
1	1	0	1	1	0	0	1

ASCII Code

Char.	ASCII	Char.	ASCII	Char.	ASCII
@	64	U	85	j	106
A	65	V	86	k	107
B	66	W	87	l	108
C	67	X	88	m	109
D	68	Y	89	n	110
E	69	Z	90	o	111
F	70	[	91	p	112
G	71	\	92	q	113
H	72	]	93	r	114
I	73	^	94	s	115
J	74	_	95	t	116
K	75	`	96	u	117
L	76	a	97	v	118
M	77	b	98	w	119
N	78	c	99	x	120
O	79	d	100	y	121
P	80	e	101	z	122
Q	81	f	102	{	123
R	82	g	103	|	124
S	83	h	104	}	125
T	84	i	105	~	126

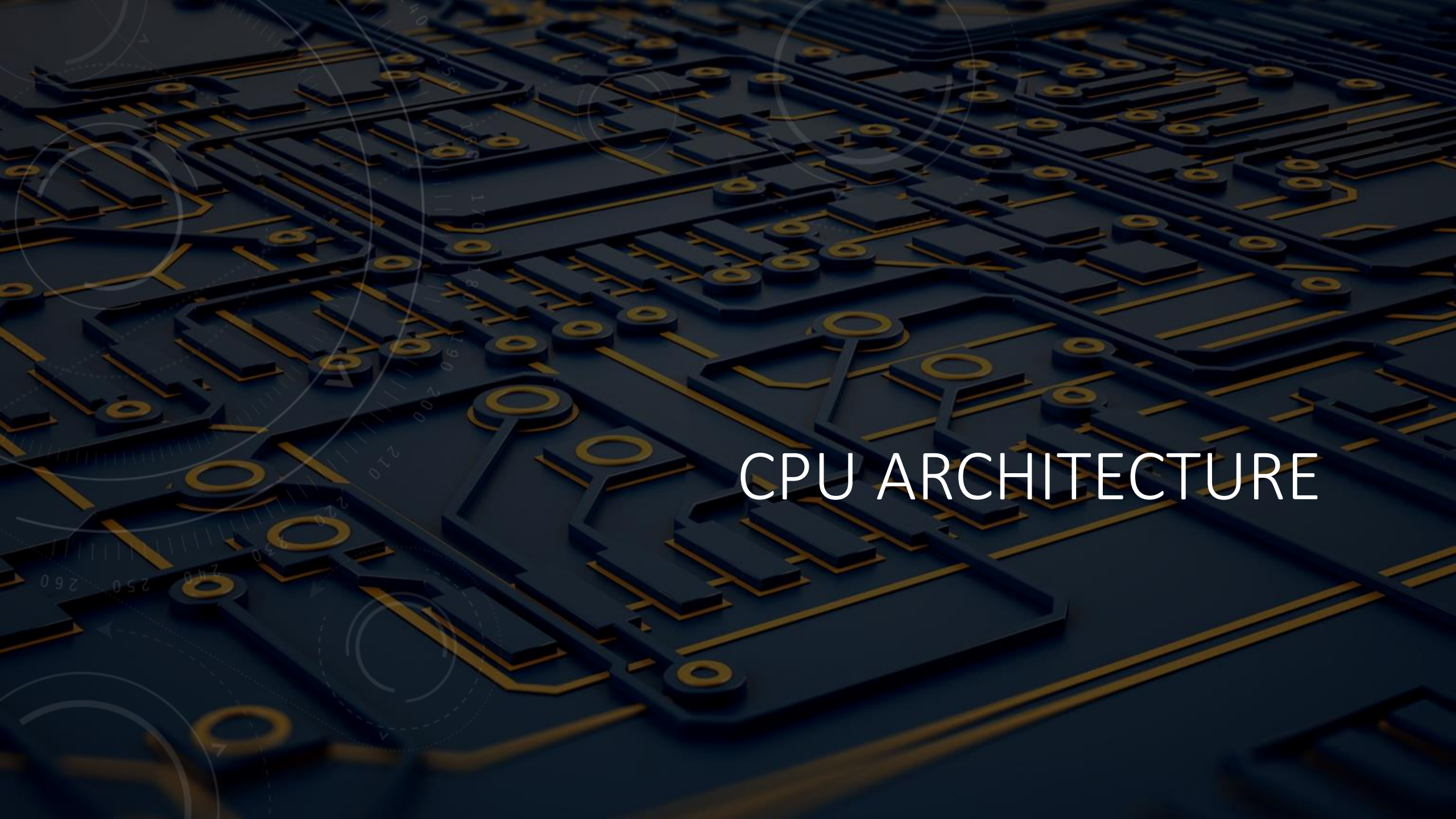


OTHER BASE FORMATS

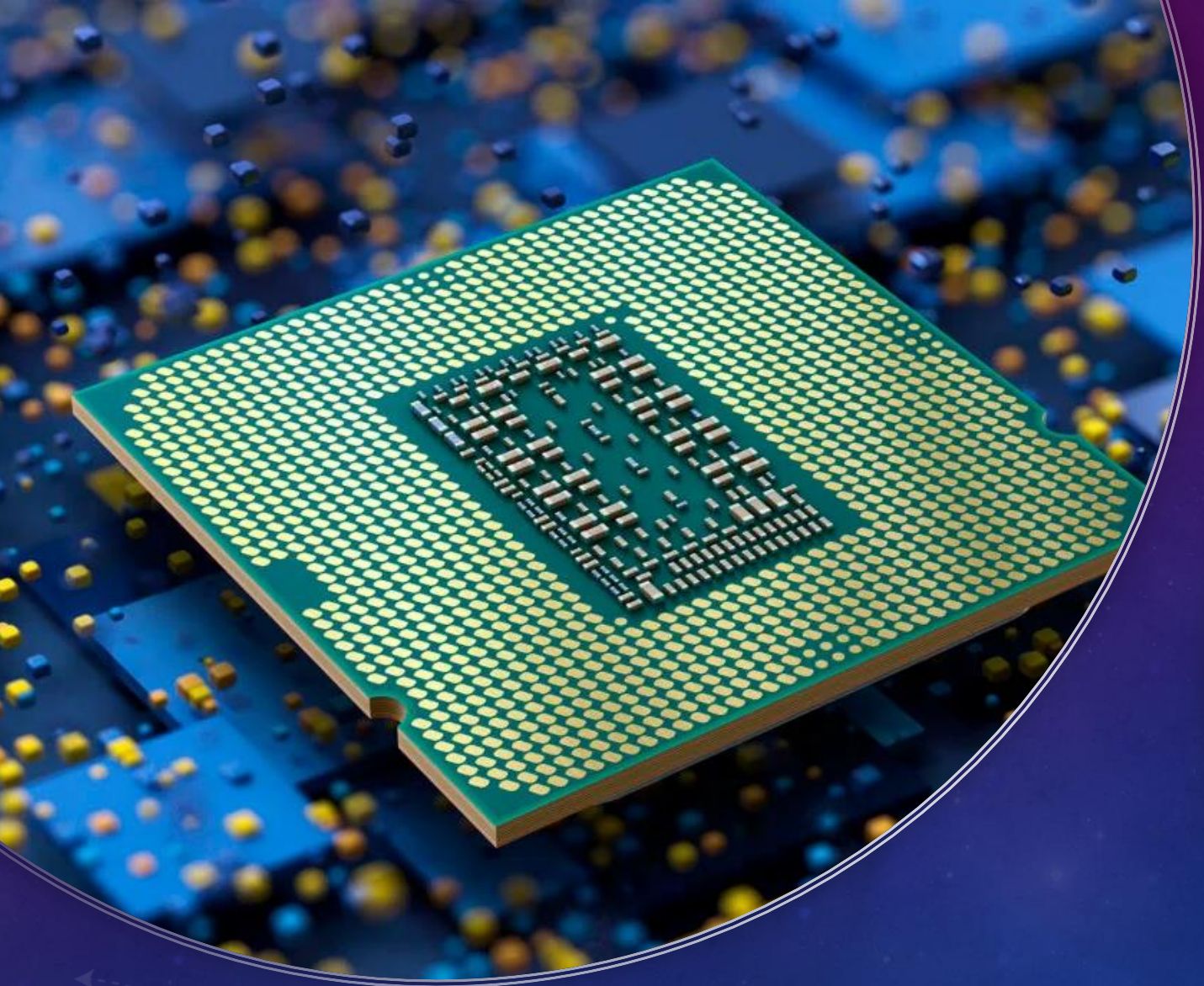
- Binary – Base 2 numbering (1, 0)
- Octal – Base 8 numbering (0,1,2,3,4,5,6,7,8,9)
- Decimal – base 10 communication (0-9)
- Hexadecimal – base 16 (0-9, A-F)

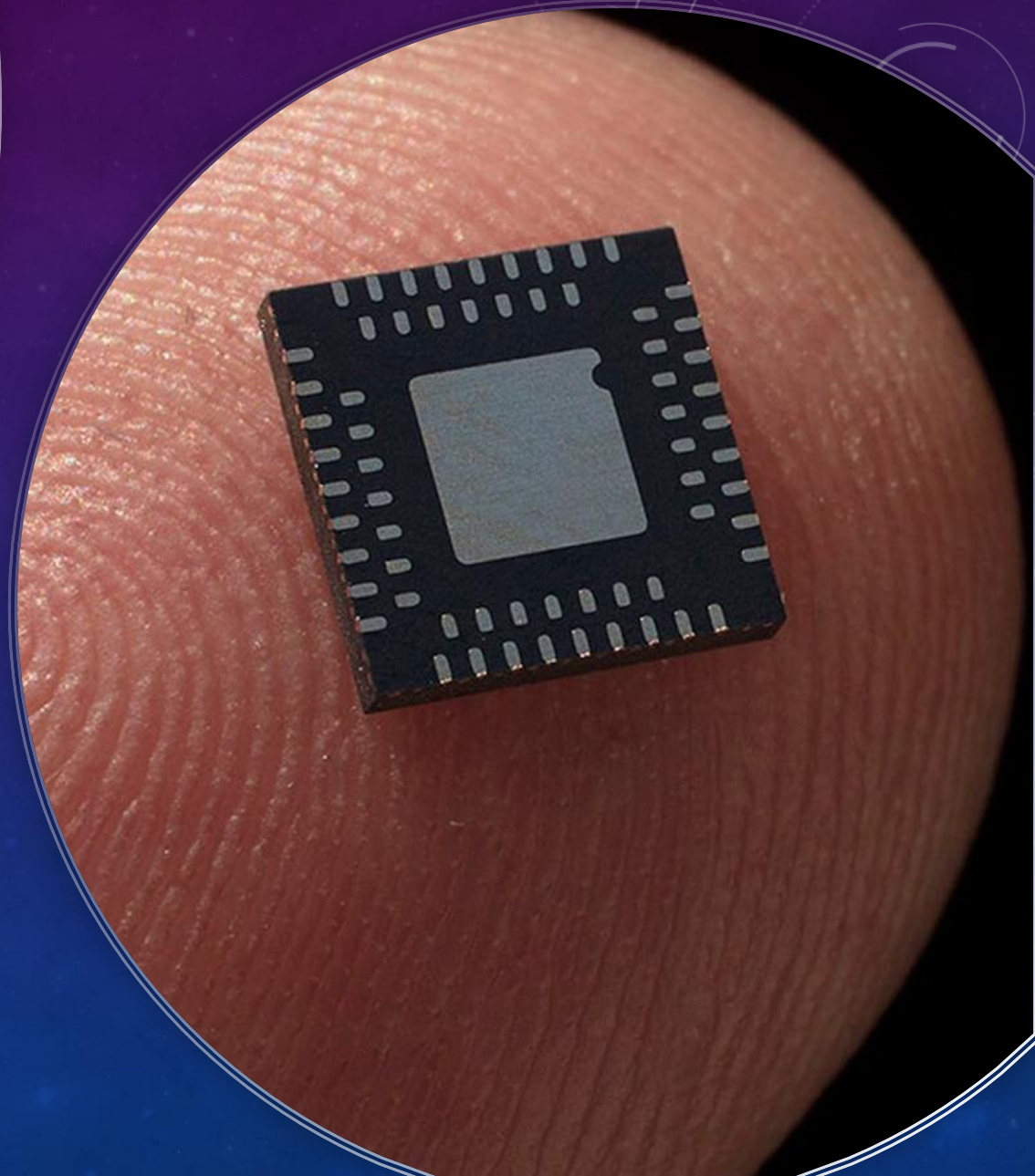
FUN WITH TRANSLATIONS!

- https://gchq.github.io/CyberChef/



CPU ARCHITECTURE





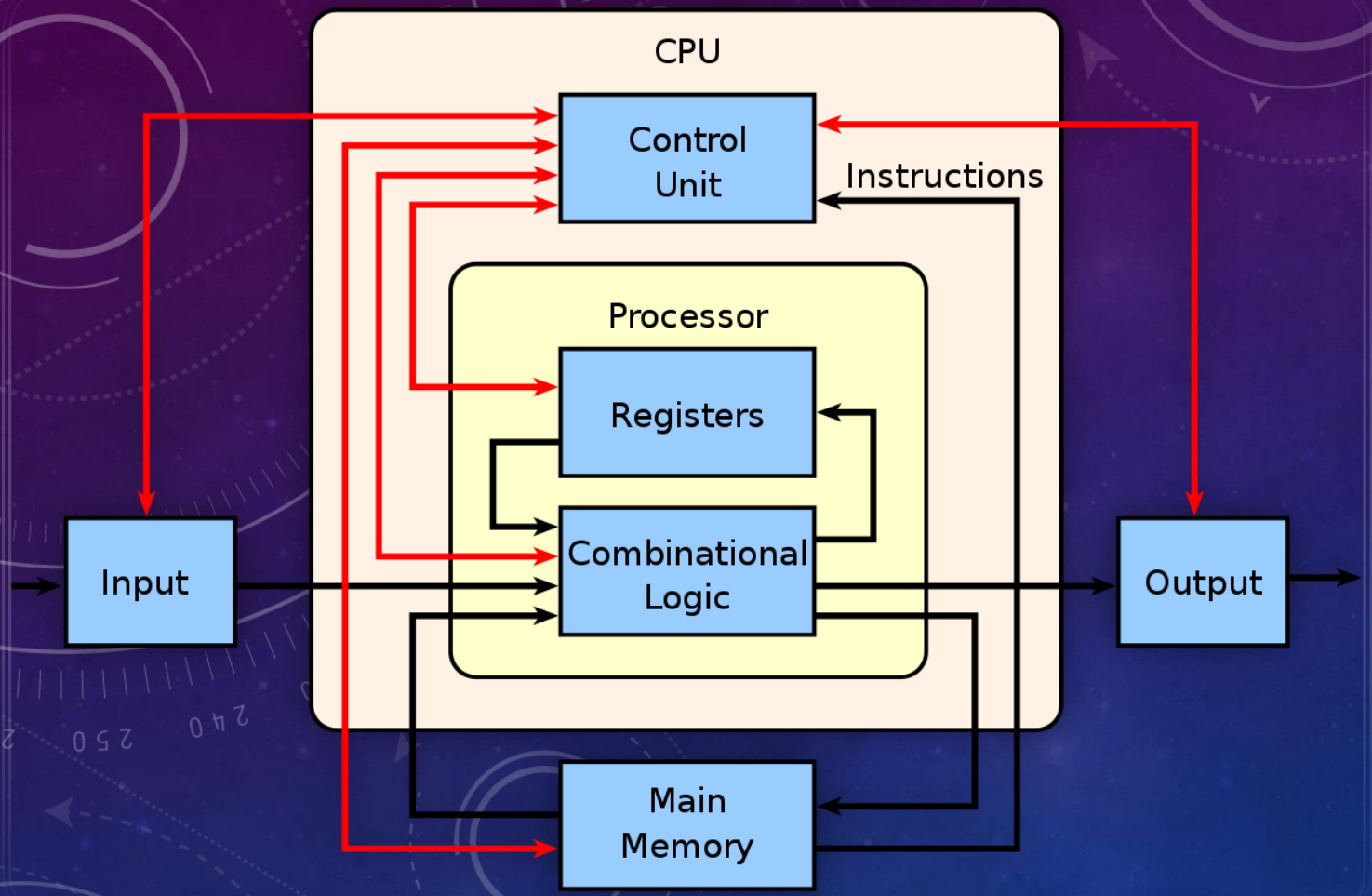
PROCESSOR CLASSIFICATIONS

- Architecture
- Processed bits
- Design
- Registers

COMMON CPU ARCHITECTURES

- X86
  - Desktop PCs
  - Most Intel chips are built on this
    - More cores
- Arm/A32
  - Small consumer electronic devices
- Arm/A64
  - New Macbook Pro M1 & M2
- RISC-V

HOW PROCESSING WORKS



SESSION REVIEW

QUESTION OR CLARIFICATIONS?

PREVIEW NEXT SESSION

SEE YOU NEXT TIME!