

Week 2 Day 1

Led by: Emily Crose

for

Oakland University

INTRODUCTION TO SOFTWARE DEVELOPMENT




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

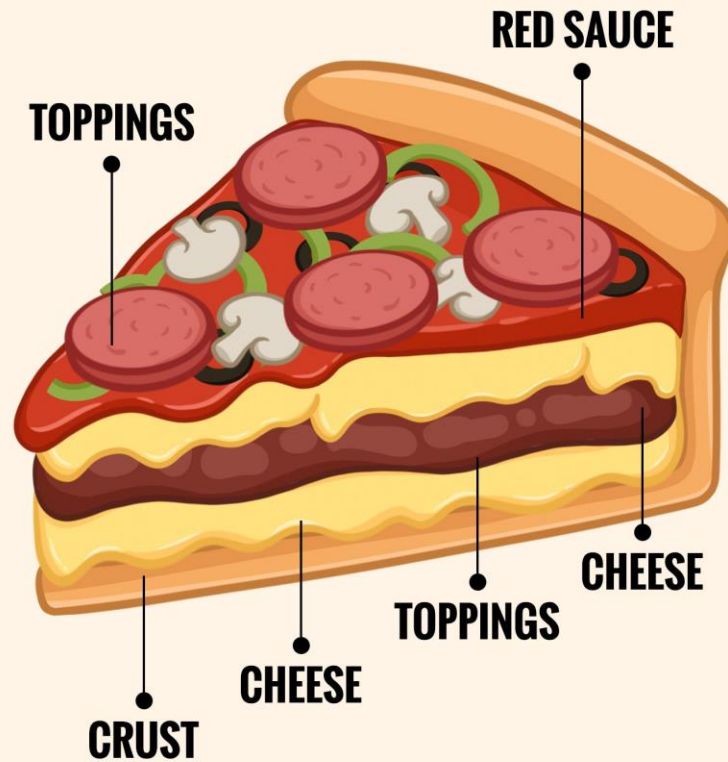


APPLICATIONS & OPERATING SYSTEMS

The background is a solid dark blue color. It features several abstract, light blue geometric patterns. These include concentric circles of varying sizes, some with dashed lines. Arrows of different lengths and orientations are scattered throughout, some pointing clockwise and others counter-clockwise. Some of the circles have numerical labels around their perimeters, such as 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, and 260. The overall effect is a sense of motion and technical precision.

OPERATING SYSTEMS OVERVIEW

DEEP DISH PIZZA

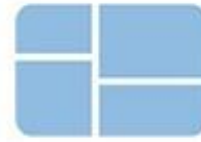


Operating System

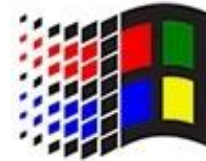


WELL-KNOWN OPERATING SYSTEMS

OLD & OUT OF SUPPORT WINDOWS VERSIONS



1.0 (1985)



3.1 (1992)



95 (1995)



XP (2001)



Vista (2006)



7 (2009)



8 (2012)



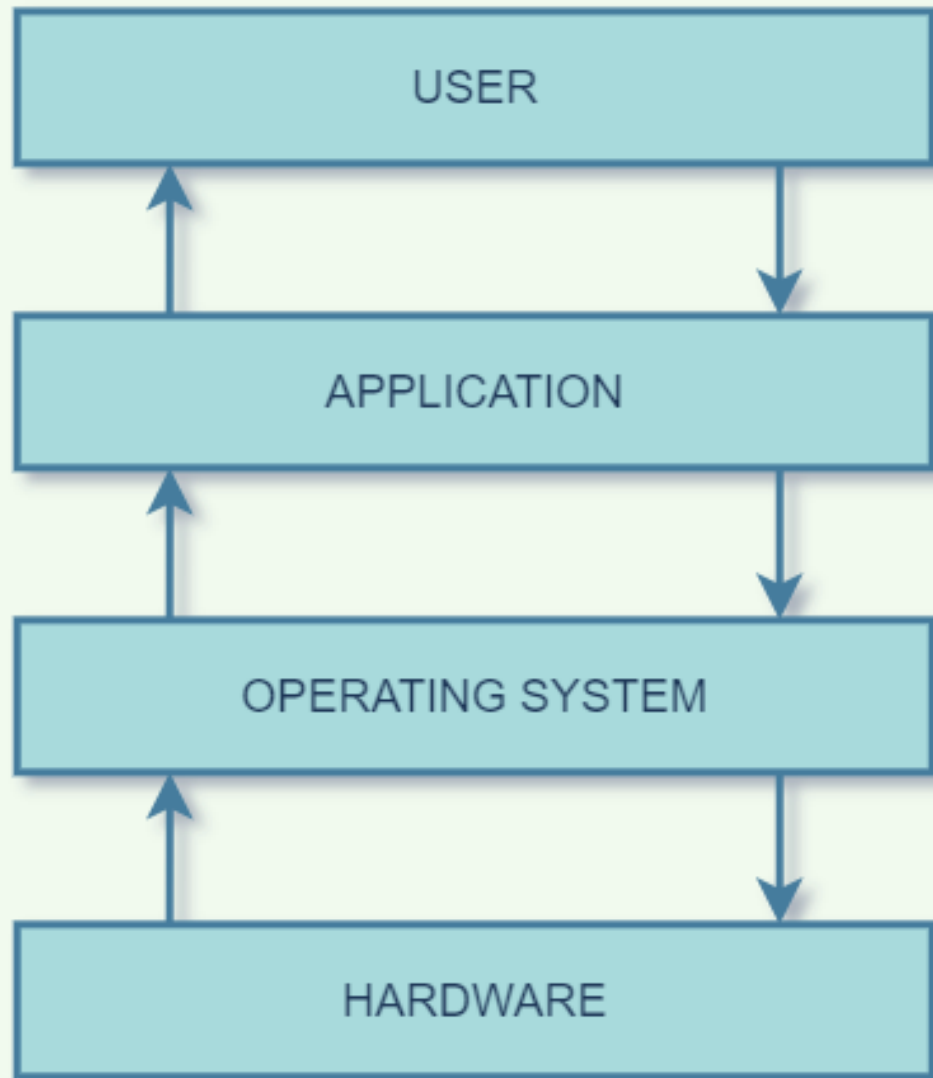
10 (2015)

TempleOS

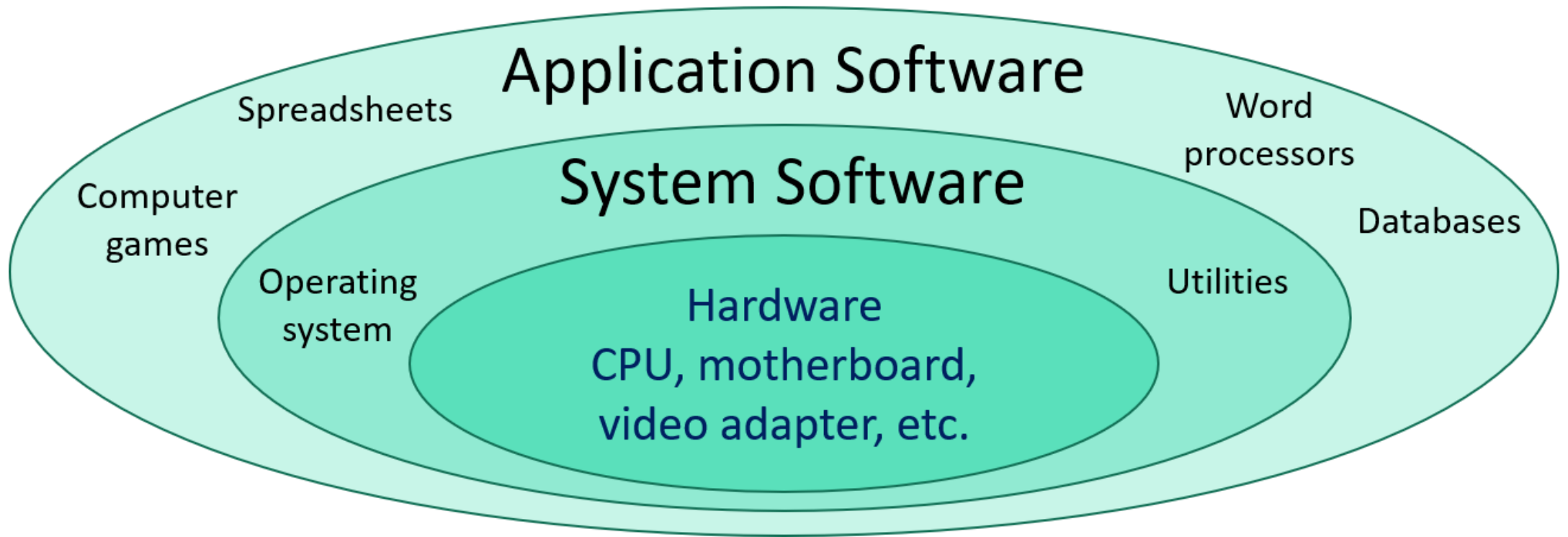
HANNAH
MONTANA
M
LINUX

```
LOCATIONS Local@Livecd /usr/ponysay/ponysay/BACKEND... About PonyOS  
FILE EDIT VIEW HELP  
cal@livecd ~$ ./etc/os-release  
cal@livecd ~$ ponysay -b round -f rarity "Hello, $PRETTY_NAME!"  
Hello, PonyOS 8.0!  
PonyOS 8.0.0  
© 2011-2022 K. Lange, et al.  
SOFTWARE RELEASED UNDER THE  
OF ILLINOIS LICENSE.  
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@staticmethod  
def getColour(input, offset)  
/usr/ponysay/ponysay/backend.krk [kr
```

FUNNY LINUX VARIANTS



OPERATING SYSTEMS VS APPLICATIONS



OPERATING SYSTEM VERSUS APPLICATION SOFTWARE

OPERATING SYSTEM

A system software that manages computer hardware and software resources and provides common services for computer programs

Works as the interface between the user and hardware, performs process management, memory management, task scheduling, hardware device controlling and many more

Developed using C, C++, Assembly languages

Boots up when the user switches on the computer and runs till he switches off the machine

Necessary for the proper functioning of the computer

Ex: Windows, Unix, Linux, DOS

APPLICATION SOFTWARE

A software designed to perform a group of coordinated functions, tasks or activities for the benefit of the user

Performs a single specific task

Developed using Java, Visual Basic, C, C++

Runs only when the user requests to run the application

Cannot be installed without an operating system

Ex: Word, Spreadsheet, Presentation, Multimedia tools, Database Management Systems

Visit www.PEDIAA.com

OS & APP DIFFERENCES

PERMISSIONS



WHAT DO PERMISSIONS DO?

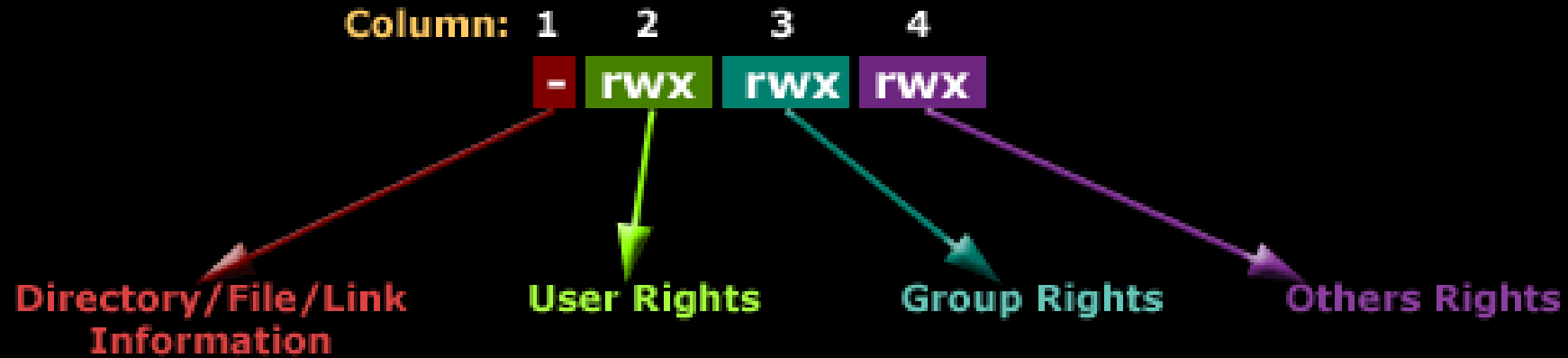
- Allow read, write, and execute permissions for files and folders
- Can be changed with those who have rights to change file and folder permissions levels
- Can be customized for users, groups, and “others”

LINUX PERMISSIONS IN PRACTICE

jpp@jpp: /boot

```
jpp@jpp:/boots$ ls -la
total 39132
drwxr-xr-x  3 root root    4096 2011-05-13 08:52 .
drwxr-xr-x 23 root root    4096 2011-05-04 09:27 ..
-rw-r--r--  1 root root 700761 2011-03-18 16:33 abi-2.6.35-28-generic
-rw-r--r--  1 root root 730039 2011-04-11 01:24 abi-2.6.38-8-generic
-rw-r--r--  1 root root 122616 2011-03-18 16:33 config-2.6.35-28-generic
-rw-r--r--  1 root root 130313 2011-04-11 01:24 config-2.6.38-8-generic
drwxr-xr-x  3 root root    12288 2011-05-04 09:32 grub
-rw-r--r--  1 root root 11008098 2011-04-15 08:58 initrd.img-2.6.35-28-generic
-rw-r--r--  1 root root 13134896 2011-05-13 08:52 initrd.img-2.6.38-8-generic
-rw-r--r--  1 root root 160988 2010-10-22 09:08 memtest86+.bin
-rw-r--r--  1 root root 163168 2010-10-22 09:08 memtest86+_multiboot.bin
-rw-r--r--  1 root root 2344143 2011-03-18 16:33 System.map-2.6.35-28-generic
-rw-----  1 root root 2654256 2011-04-11 01:24 System.map-2.6.38-8-generic
-rw-r--r--  1 root root    1336 2011-03-18 16:35 vmcoreinfo-2.6.35-28-generic
-rw-----  1 root root    1368 2011-04-11 01:26 vmcoreinfo-2.6.38-8-generic
-rw-r--r--  1 root root 4342384 2011-03-18 16:33 vmlinuz-2.6.35-28-generic
-rw-----  1 root root 4523936 2011-04-11 01:24 vmlinuz-2.6.38-8-generic
jpp@jpp:/boots$
```

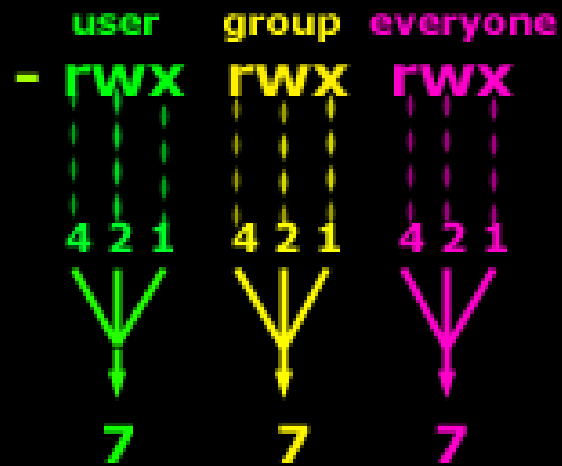
Understanding The Linux File Permissions



While the first column defines a directory, file or link, the next 3 columns (2, 3, 4) define the permissions for the User, Group and Others (everyone else) groups.

UNDERSTANDING PERMISSIONS

Linux Permissions Made Easy



Final calculated permissions

This example shows us how the permissions can be calculated using the simple method of addition, where each permission is assigned a number. Adding them will produce the appropriate number for the rights given.

LINUX PERMISSIONS



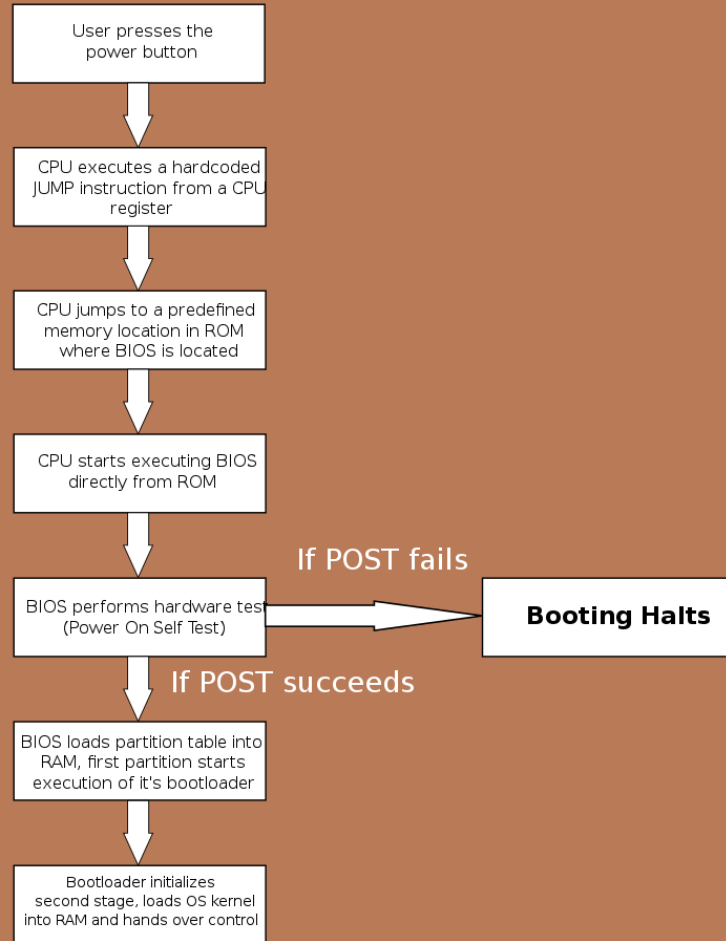
Your PC ran into a problem and needs to restart. We'll restart for you.



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

Computer booting sequence

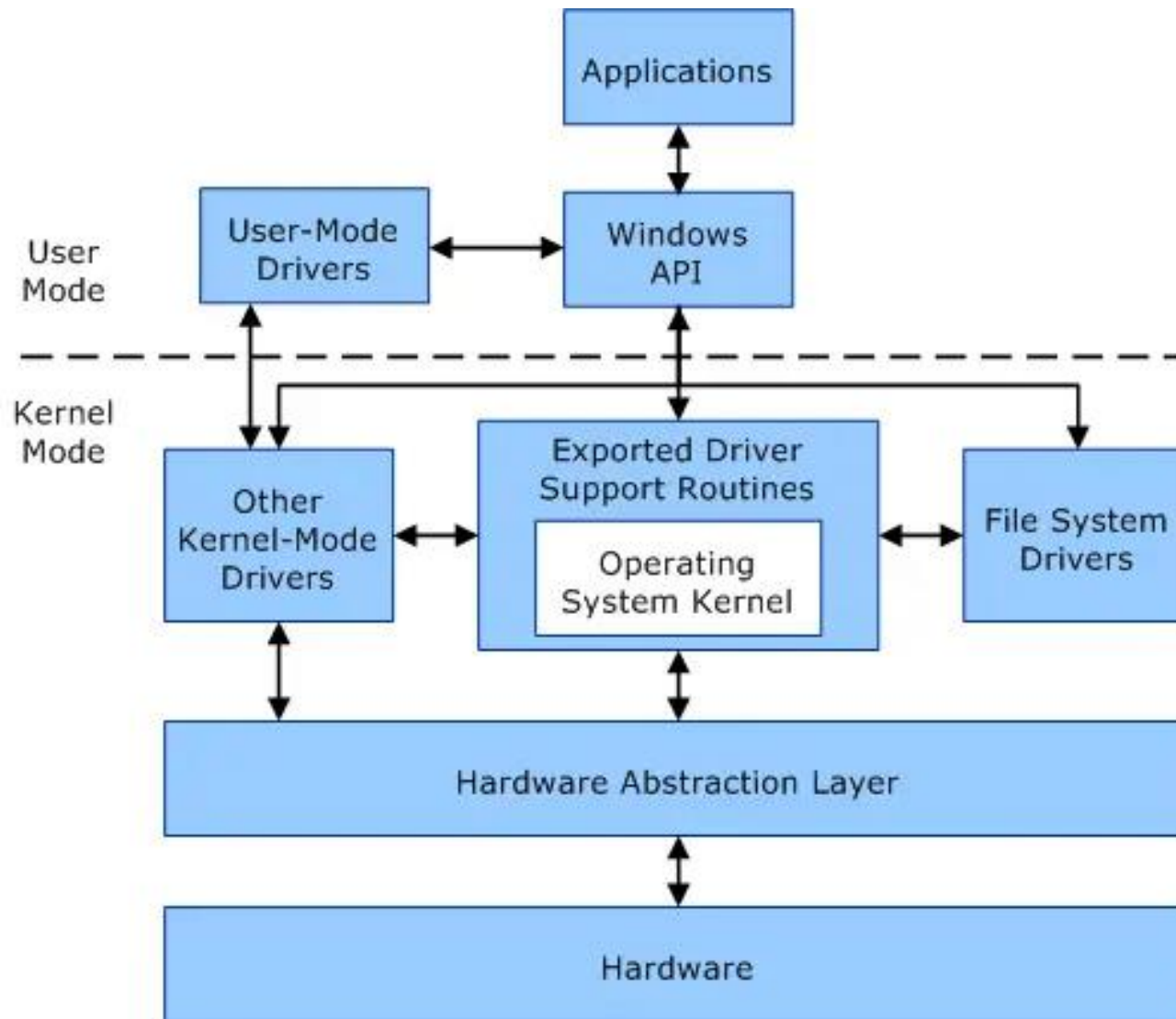


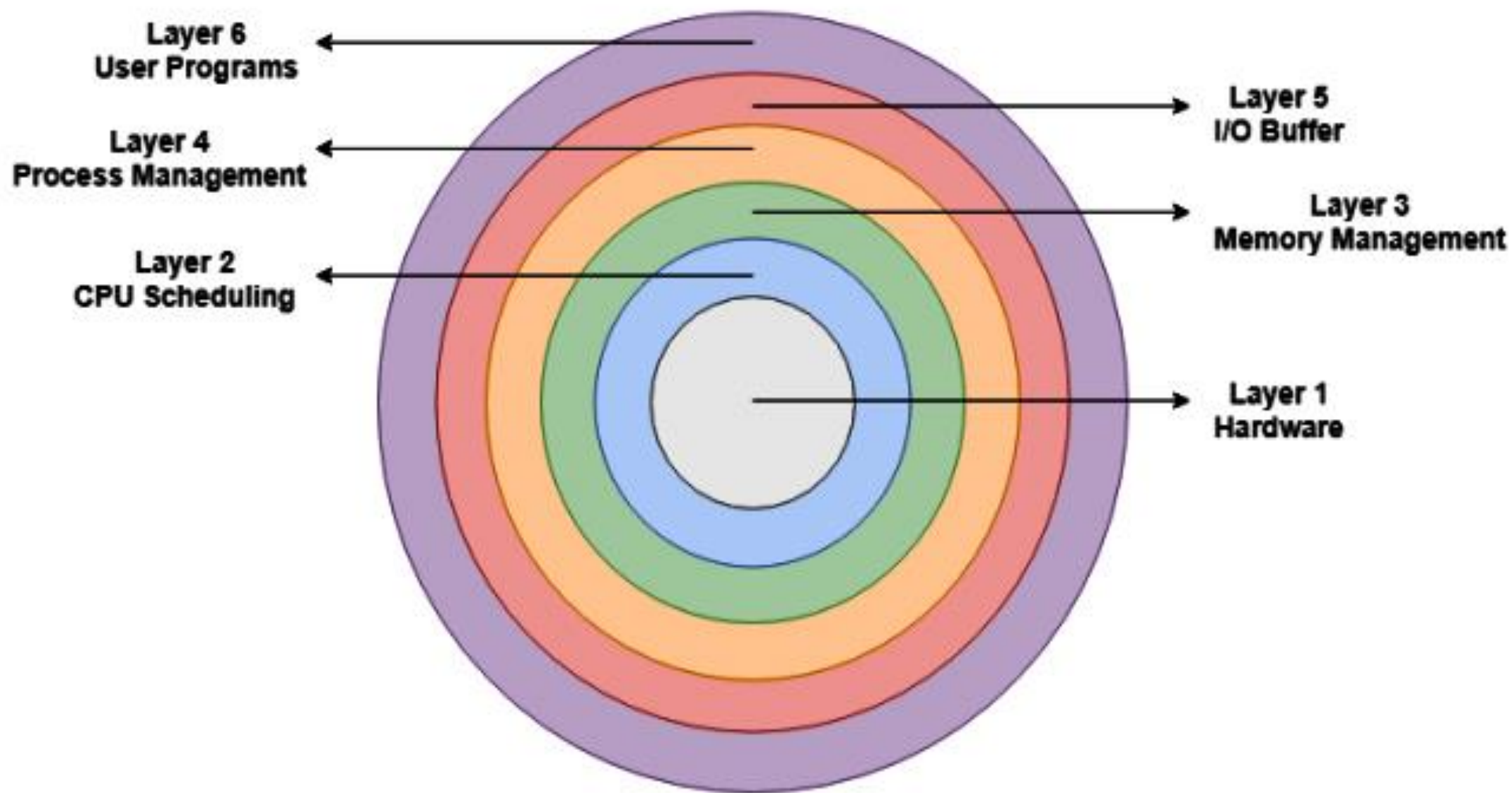
POWER-ON SELF-TEST (POST)

A close-up portrait of an older man with white hair, a mustache, and glasses, smiling. The image is overlaid with a blue and purple gradient and technical graphics, including concentric circles, dashed lines, and numerical scales (40, 150, 160, 170, 180, 190, 200, 210, 220, 230, 240, 250, 260).

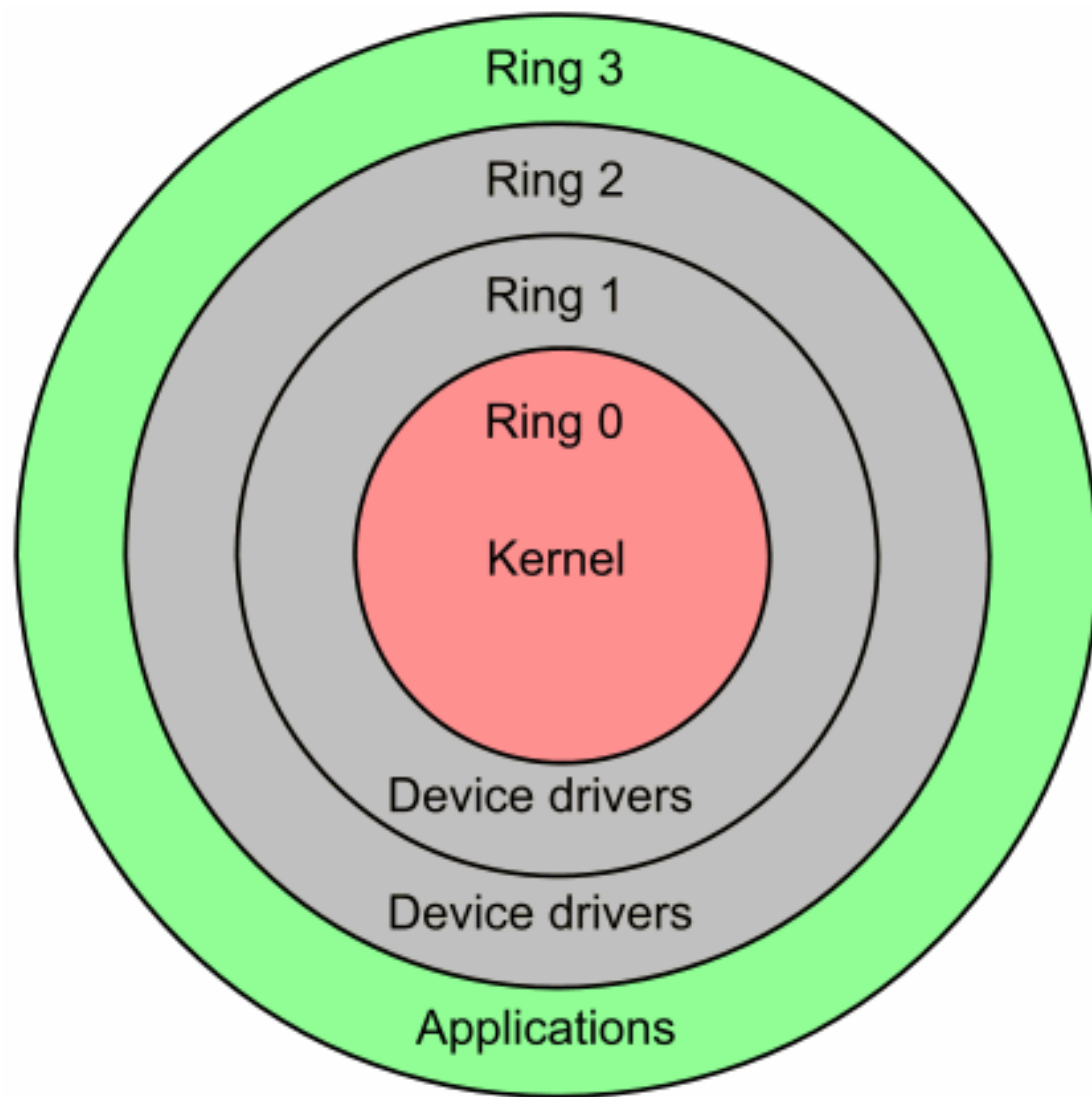
THE KERNEL

RIP, King





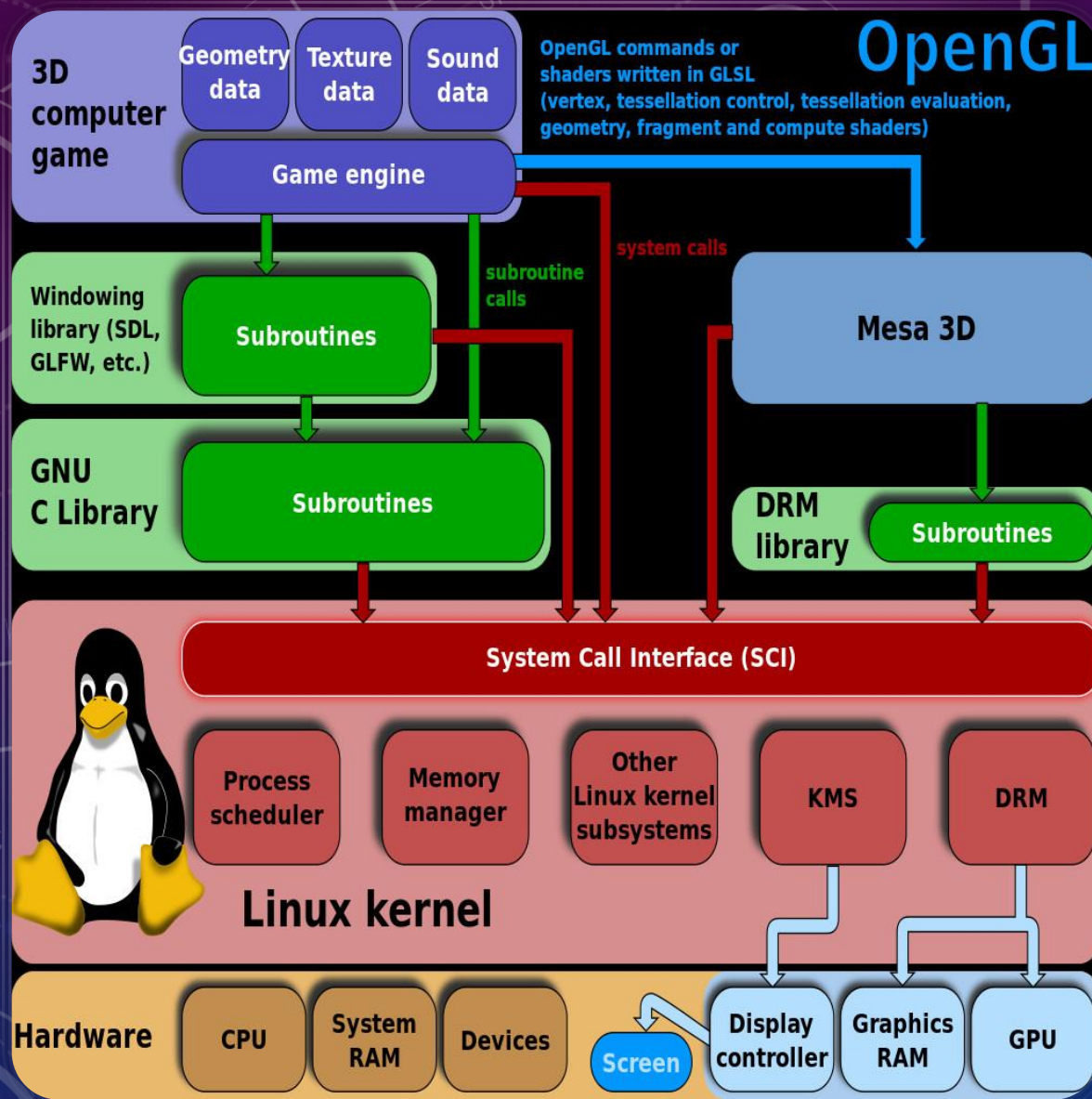
Layers of operating system



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

Thick client Architecture



Thin client Architecture





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 Application Architecture



WEB
APPLICATIONS

EMBEDDED SOFTWARE & SYSTEMS



Industrial Robots



GPS Receivers



Digital Cameras



DVD Players



Wireless Routers

Embedded Systems



MP3 Players



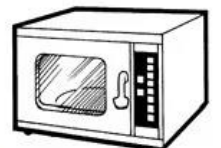
Set top Boxes



Gaming Consoles

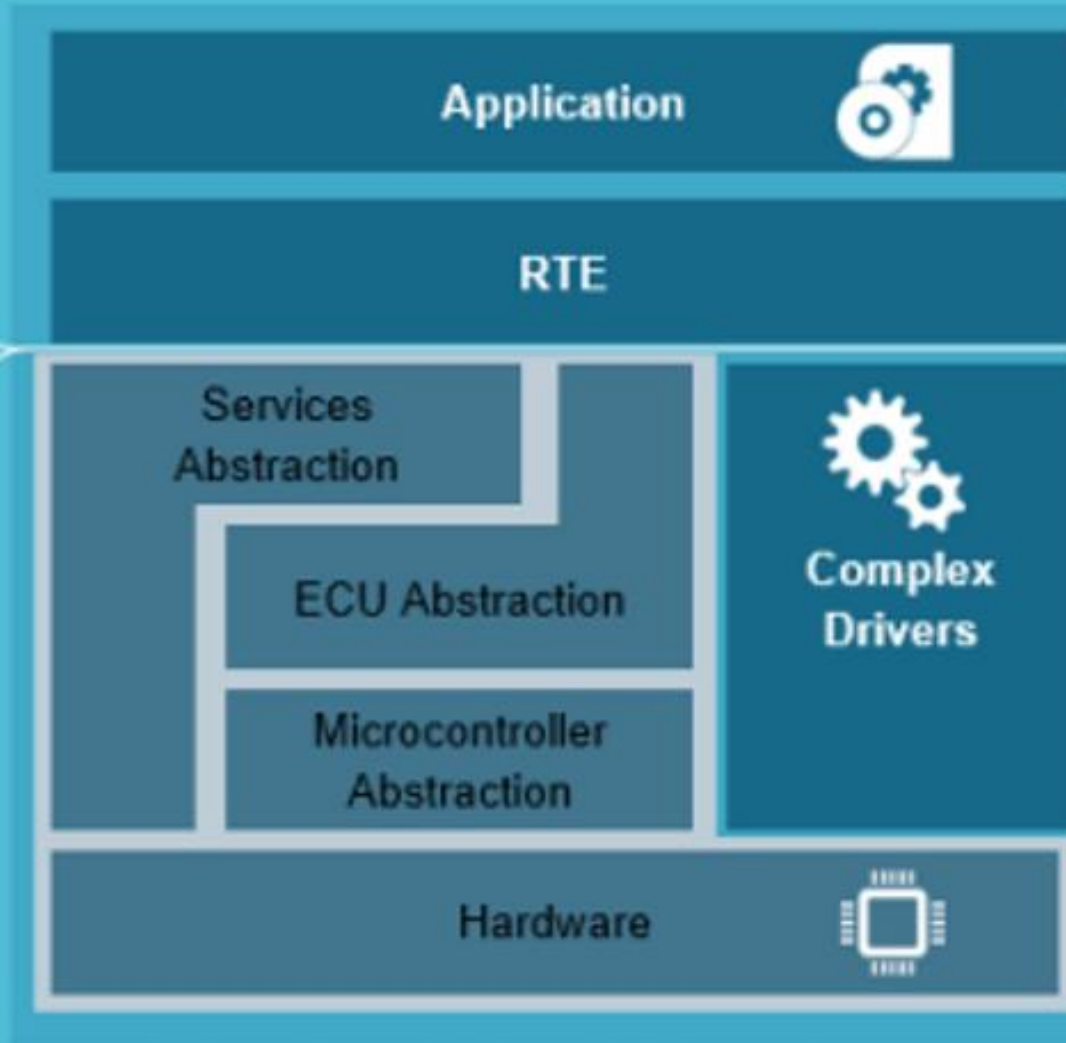


Photocopiers



Microwave Ovens

EMBEDDED SOFTWARE APPLICATION



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



The background is a deep blue gradient filled with a dense, slightly blurred pattern of binary digits (0s and 1s). Overlaid on this are several faint, light blue circular and semi-circular lines of varying radii, some with small arrowheads pointing in different directions. On the left side, there are vertical scale-like markings with numbers ranging from 140 to 260, accompanied by small tick marks.

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 — — ● ●

A painting of two muscular men shaking hands. The man on the left is wearing a white shirt and a dark vest, while the man on the right is wearing a red shirt. They are both flexing their muscles and shaking hands in a firm grip. The background is a dark, cloudy sky.

**BINARY
COMMUNICATION**

**SOFTWARE
DEVELOPERS**

**TELEGRAPH
OPERATORS**

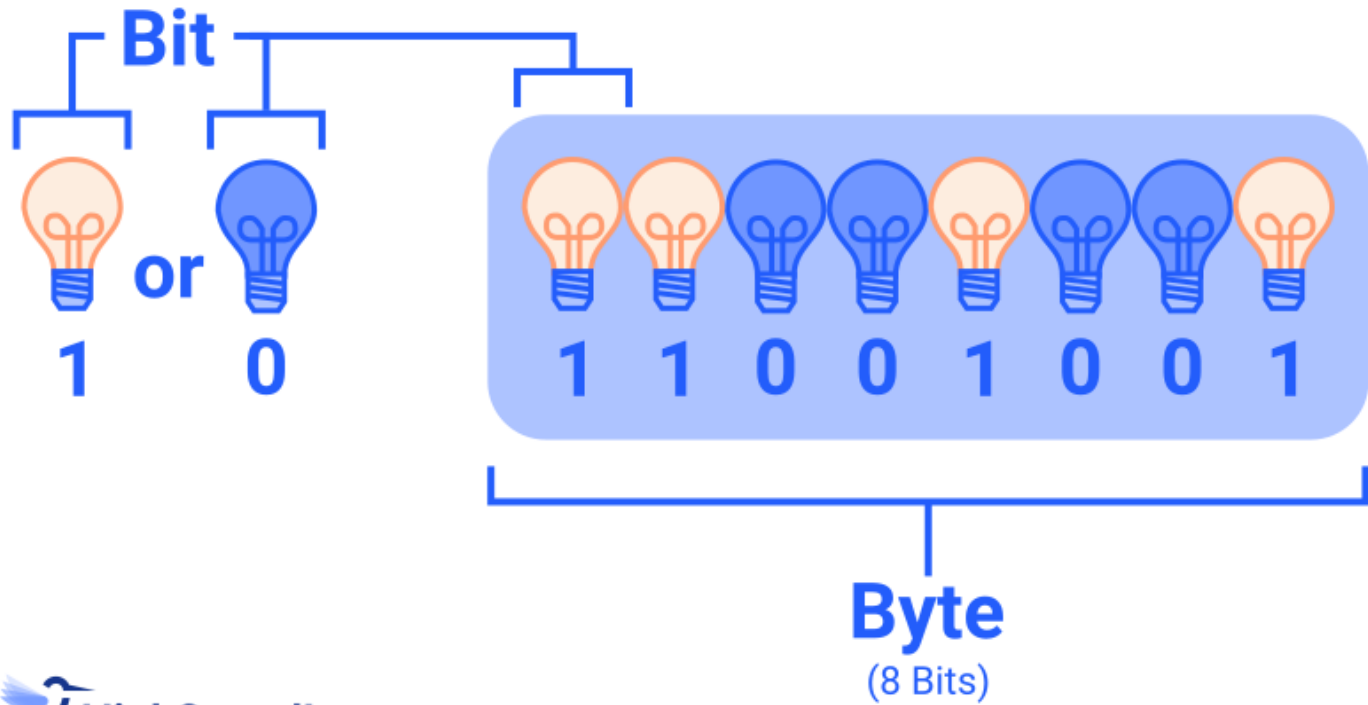
BIT



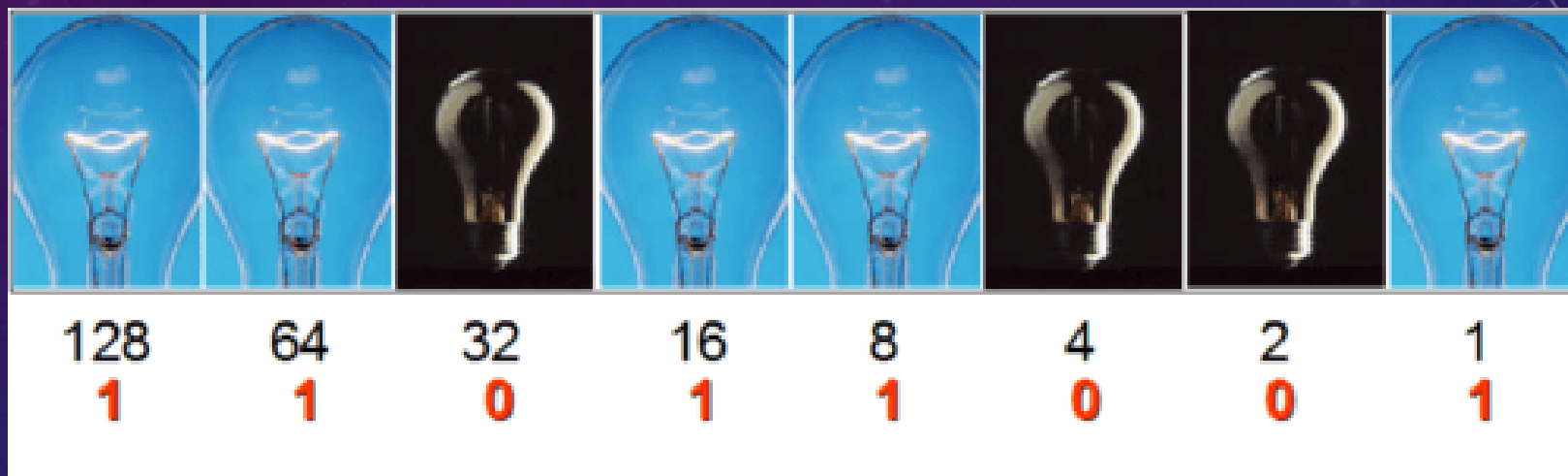
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BITS & BYTES



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

B → 1000010

L → 1101100

U → 1110101

e → 1100101

OTHER BASE FORMATS

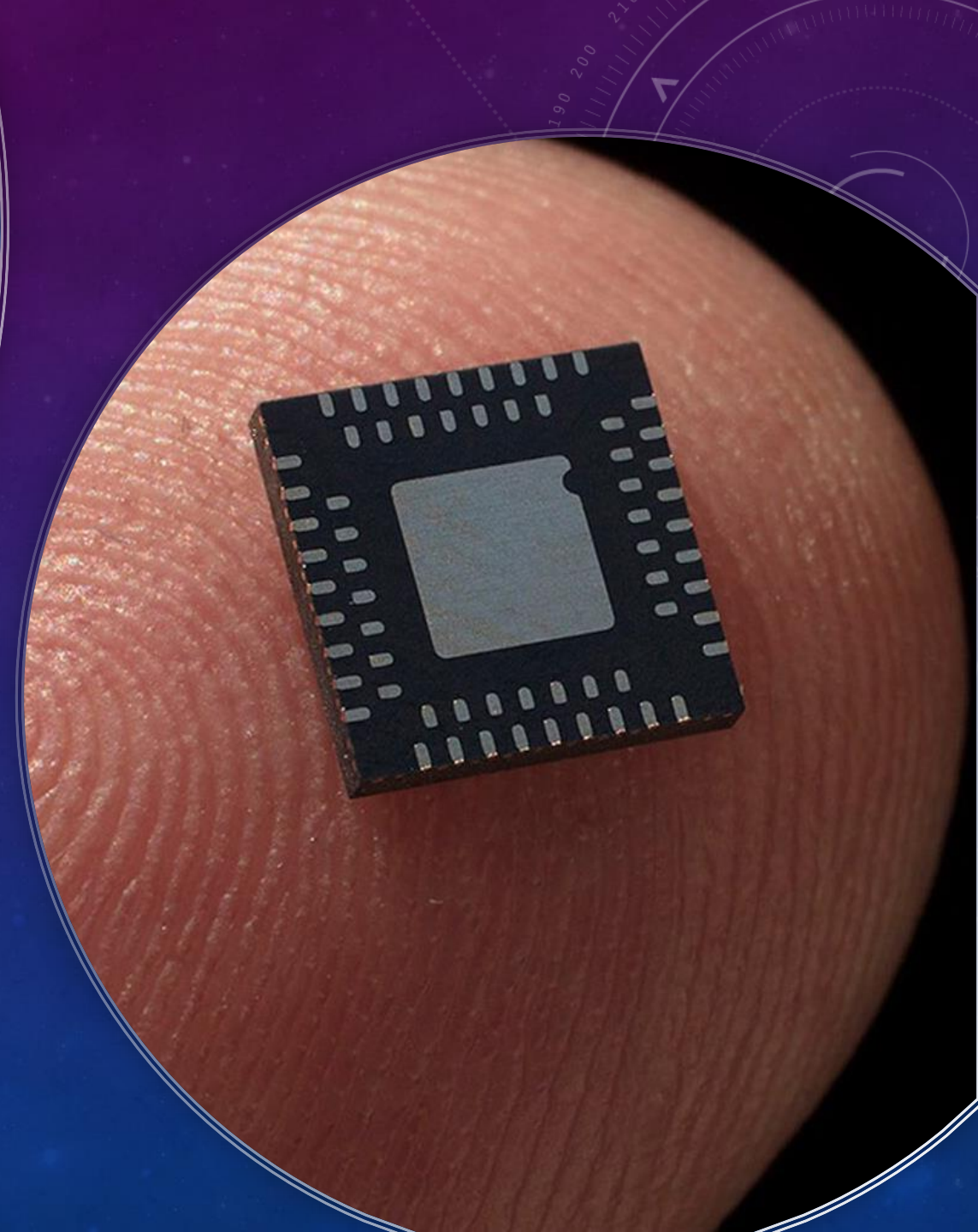
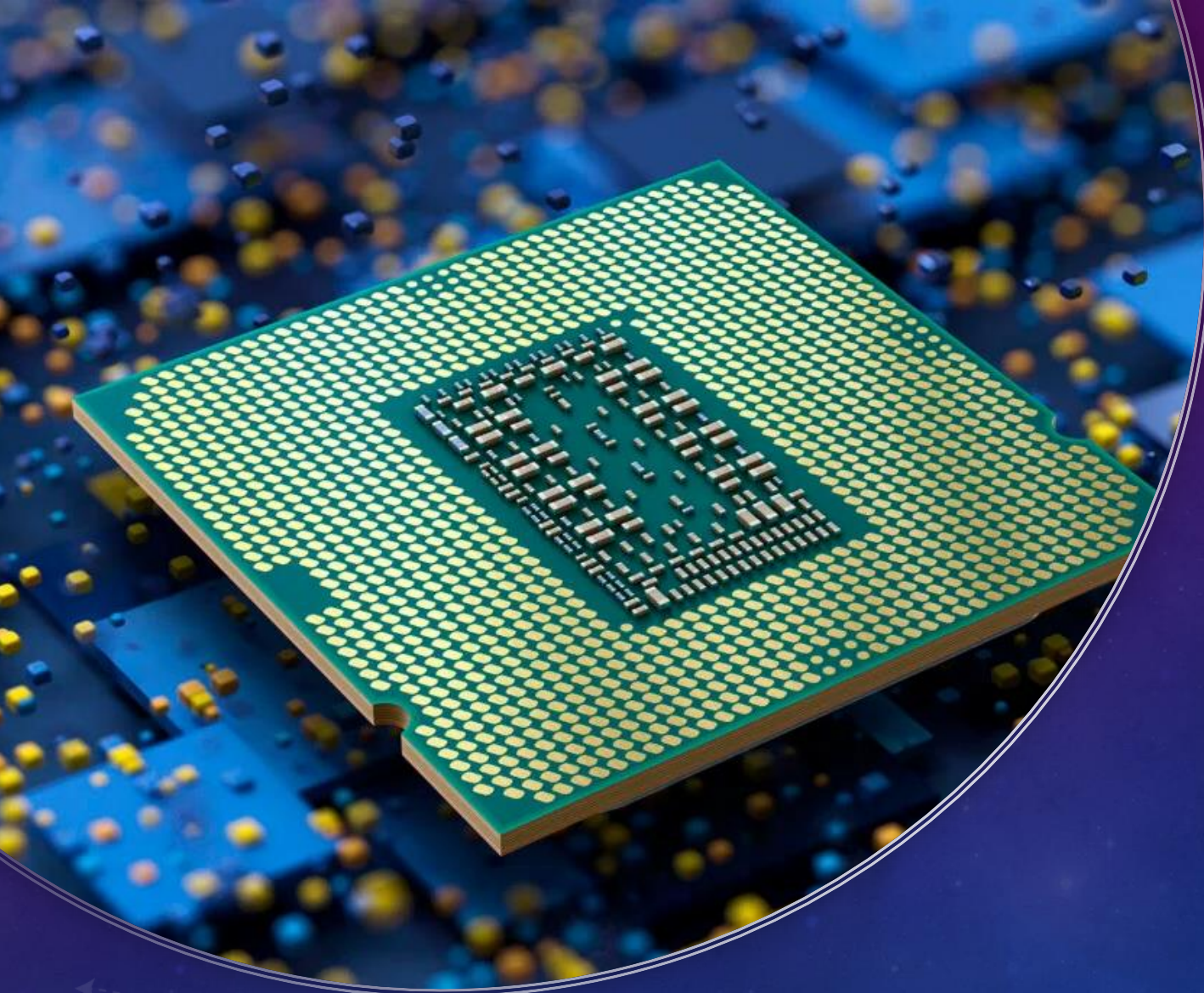
- Binary – Base 2 numbering (1, 0)
- Octal – Base 8 numbering (0,1,2,3,4,5,6,7,8,9)
- Decimal – base 10 communication (0-9)
- Hexadecimal – base 16 (0-9, A-F)

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!
