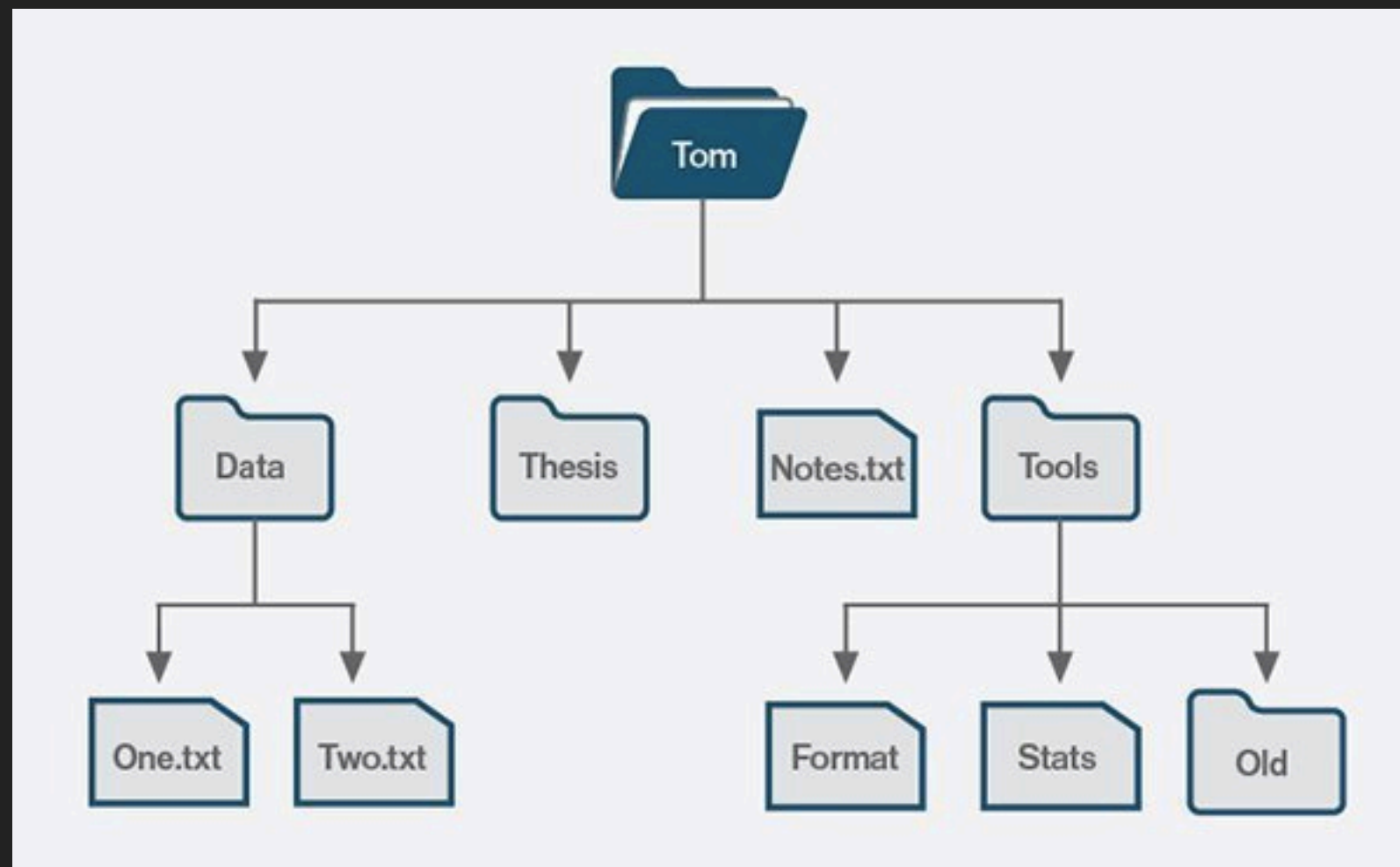
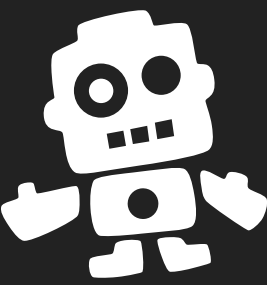


## FILES AND FILE SYSTEMS

- ▶ In computing, a file system controls how data are stored and retrieved.





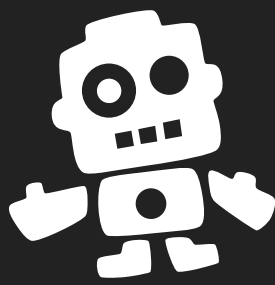
## FILES AND FILE SYSTEMS

- ▶ Why do we need a file system?

Not needed for data types like `int`, `char`, `struct`, and even `class`, but required for more complex data storage

Without a file system it's difficult to tell where one piece of information stops and the next begins

Especially useful when using mass storage devices



# FILES AND FILE SYSTEMS

## ► What is a file?

A named collection containing data and metadata like *creation time*, *length*, and any number of other *attributes*

### *The Canonical WAVE file format*

endian	File offset (bytes)	field name	Field Size (bytes)	
big	0	ChunkID	4	The "RIFF" chunk descriptor
little	4	ChunkSize	4	
big	8	Format	4	
big	12	Subchunk1 ID	4	The "fmt" sub-chunk
little	16	Subchunk1 Size	4	
little	20	AudioFormat	2	
little	22	NumChannels	2	
little	24	SampleRate	4	
little	28	ByteRate	4	
little	32	BlockAlign	2	
little	34	BitsPerSample	2	
big	36	Subchunk2 ID	4	The "data" sub-chunk
little	40	Subchunk2 Size	4	
little	44	data	Subchunk2Size	

The "RIFF" chunk descriptor

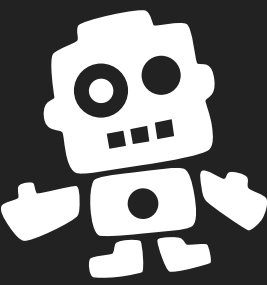
The Format of concern here is "WAVE", which requires two sub-chunks: "fmt" and "data"

The "fmt" sub-chunk

describes the format of the sound information in the data sub-chunk

The "data" sub-chunk

Indicates the size of the sound information and contains the raw sound data



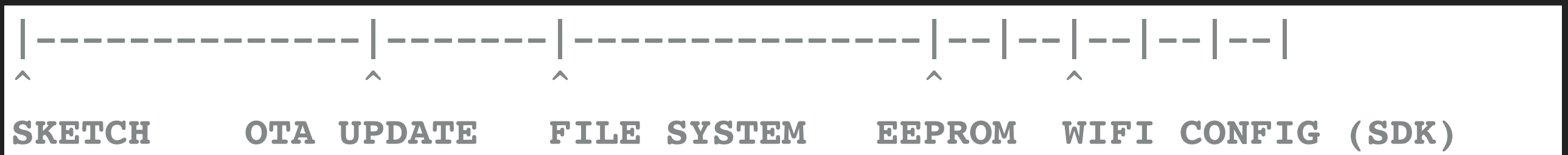
## FILES AND FILE SYSTEMS

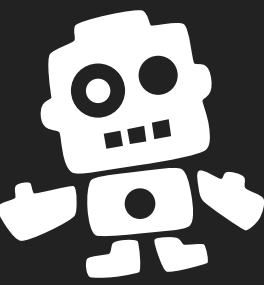
- ▶ What File System does the ESP8266 use?



Computers (disks) use File Systems such as NTFS, EXT3, APFS, etc.

Given their limited resources, microcontrollers and SoCs use especial File Systems such as SPIFFS





## FILES AND FILE SYSTEMS

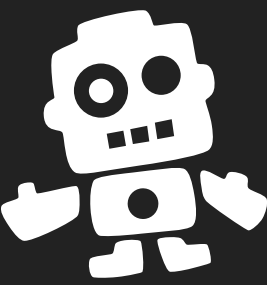
### ► Why use SPIFFS?

PROS:

Specifically designed for low ram usage

Built-in file system consistency checks

It can run on any NOR flash, not only SPI flash



## FILES AND FILE SYSTEMS

### ► Why use SPIFFS?

#### CONS:

Does not support directories (uses a flat structure)

It is not a real-time stack. One write operation might last much longer than another.

Intended for small memory devices (< 128MB)