

Design and development of embedded systems for the Internet of Things (IoT)

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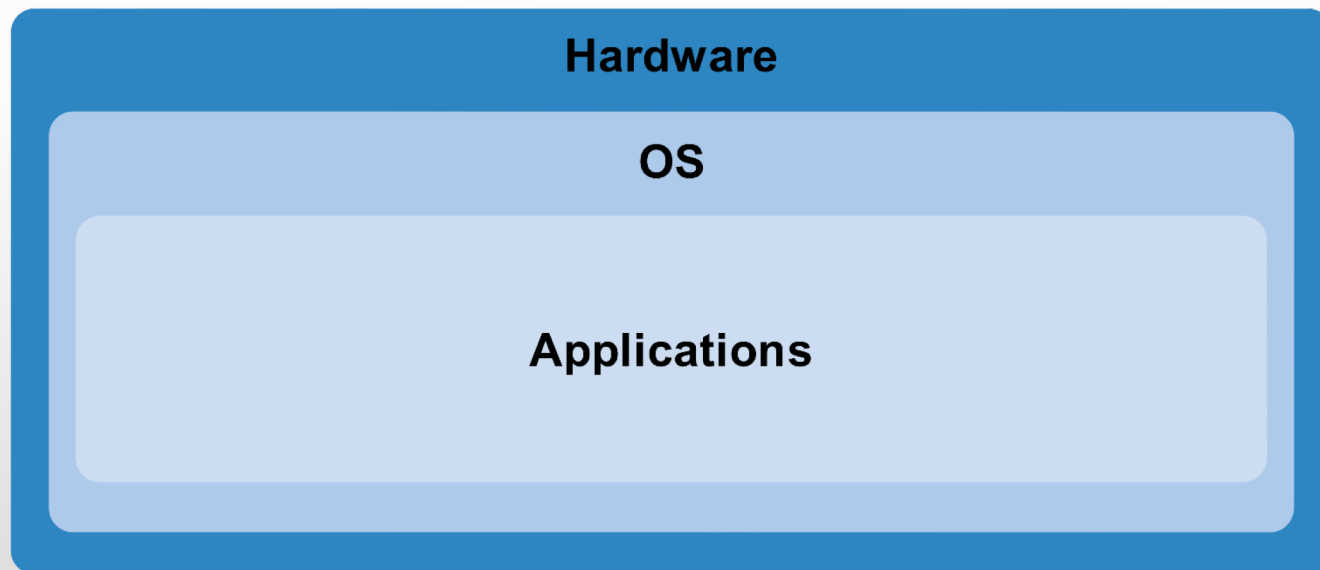
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W • S E N S E
INTEGRATED CABLELESS SOLUTIONS

What is an OS?

The OS is a computer program that supports the underlying hardware's basic functions and provides services to other programs that run on the computer.



Multitasking and the scheduler

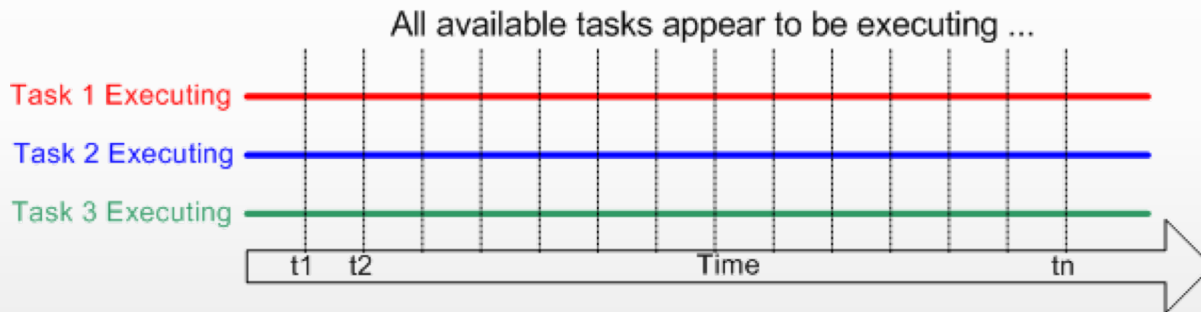
Most operating systems appear to allow multiple programs to execute at the same time, in reality a single task can run for each processor core. This is called **multitasking**.

The type of an operating system is defined by **how the scheduler decides** which program to run and when.



RTOS

The scheduler in a Real Time Operating System (RTOS) is designed to **provide a predictable (normally described as *deterministic*) execution pattern.**



What is FreeRTOS?

FreeRTOS is a class of RTOS that is designed to be small enough to run on a microcontroller.

FreeRTOS therefore provides the core real time scheduling functionality, timing and synchronization primitives and inter-task communication only.

This means it is more accurately described as a **real time kernel**.



Why FreeRTOS?

- Free under MIT license
- Professionally developed
- Strictly quality controlled
- Robust
- Supported
- High quality C source code
- Large and growing user base and community
- Tons of examples
- Portable



Memory allocation

Can be static or dynamic.

Dynamic allocation is more flexible, and it is used during the course.

Static allocation on the other hand is more robust and for some safety related application is needed.



Task management

Tasks are C functions, which must return void and take a void pointer parameter:

```
void ATaskFunction( void *pvParameters );
```

It could run indefinitely, so that can include an infinite loop, like *while(1)* or *for(;;)*



Basic task states

