



UNIVERSIDAD
COMPLUTENSE
MADRID

Logging

Debugging with *printf*?

- ❑ We always recommend NOT to debug with *printf*...
 - But sometimes it is the fastest way to see what's wrong
- ❑ But, in our case, it still remains: do not use *printf*
 - There are better options to LOG the execution
 - You could even create your own API and implement it as a library

- ❑ Time
 - Date / Timestamp
- ❑ Log level
 - Verbose, Trace, Debug, *Warning*, Error...
 - Allows to manage the amount of logging
 - <https://reflectoring.io/logging-levels/>
- ❑ Category
 - File
 - Module
 - Service
 - Task
- ❑ Message
 - Make it understandable!!

IMPORTANT: make it easy to *parse*

<https://www.scalyr.com/blog/the-10-commandments-of-logging/>

- ❑ Debug (look for errors)
- ❑ Audit
 - Important events to management/legal
 - Incoming connections, users connected...
- ❑ Profiling
 - *timestamps* before/after certain modules or critical peaces of code
- ❑ Stats
 - *Logs* related to events so we can later analyze the behavior of the application, users...
- ❑ NEVER log sensitive information
 - Keys, card number...

- ❑ 5 log levels
 - Error – Warning- Info – Debug – Verbose
- ❑ It allows to decide the log level to show
 - Compile time: *menuconfig* → **CONFIG_LOG_DEFAULT_LEVEL**
 - Initializes LOG_LOCAL_LEVEL
 - Run-time: [esp_log_level_set\(\)](#) selects log level per module
 - One argument is the module ID
- ❑ One macro per log level:
 - ESP_LOGE, ESP_LOGW, ESP_LOGI, ESP_LOGD, ESP_LOGV
- ❑ Each C file (module) must define its TAG (identifier)
 - `static const char* TAG = "MyModule";`

Doc: <https://docs.espressif.com/projects/esp-idf/en/stable/api-reference/system/log.html>

Where is the log output?

- ❑ During development, serial port is the best option
 - The client in our computer may dump it in a file if required
 - ESP-IDF redirects *log* to UART0 by default
- ❑ But once the system is deployed, serial port is useless
 - But log may be still useful for audit, debugging...
- ❑ Send *log* through the network.
 - It may be expensive (energy, money...)
- ❑ Redirect *log* to storage
 - Flash, SD...
 - Ideally, we could remotely access the log
- ❑ ESP-IDF allows to redirect log
 - `esp_log_set_vprintf(vprintf like t func)`