Debugging nRF52 boards with Visual Studio Code

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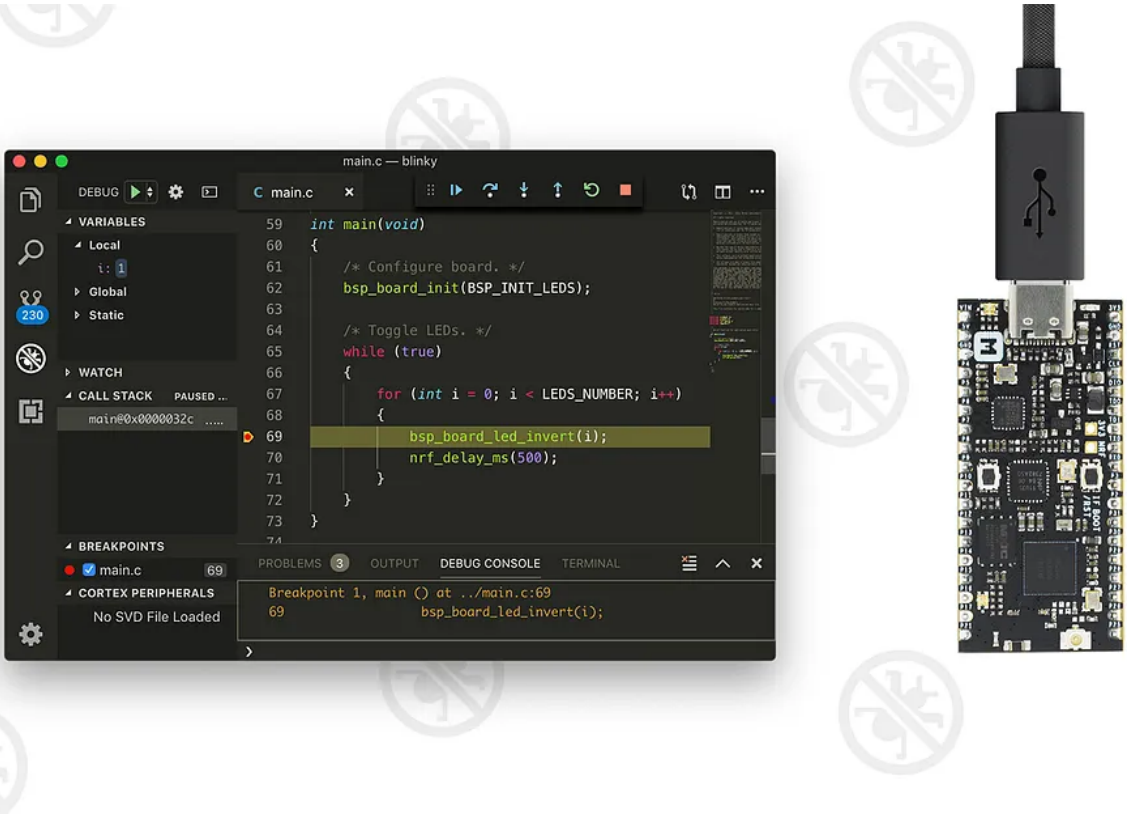


Introduction

Visual Studio Code is a lightweight but powerful source code editor which runs on your desktop and is available for Windows, macOS and Linux. With the addition of the C/C++ extension to Visual Studio Code, you might have what is needed in such a small, cross-platform editor.

This post explains how to configure the local debug toolchain for debugging nRF52 boards(e.g., nRF52840-MDK) with Visual Studio Code.

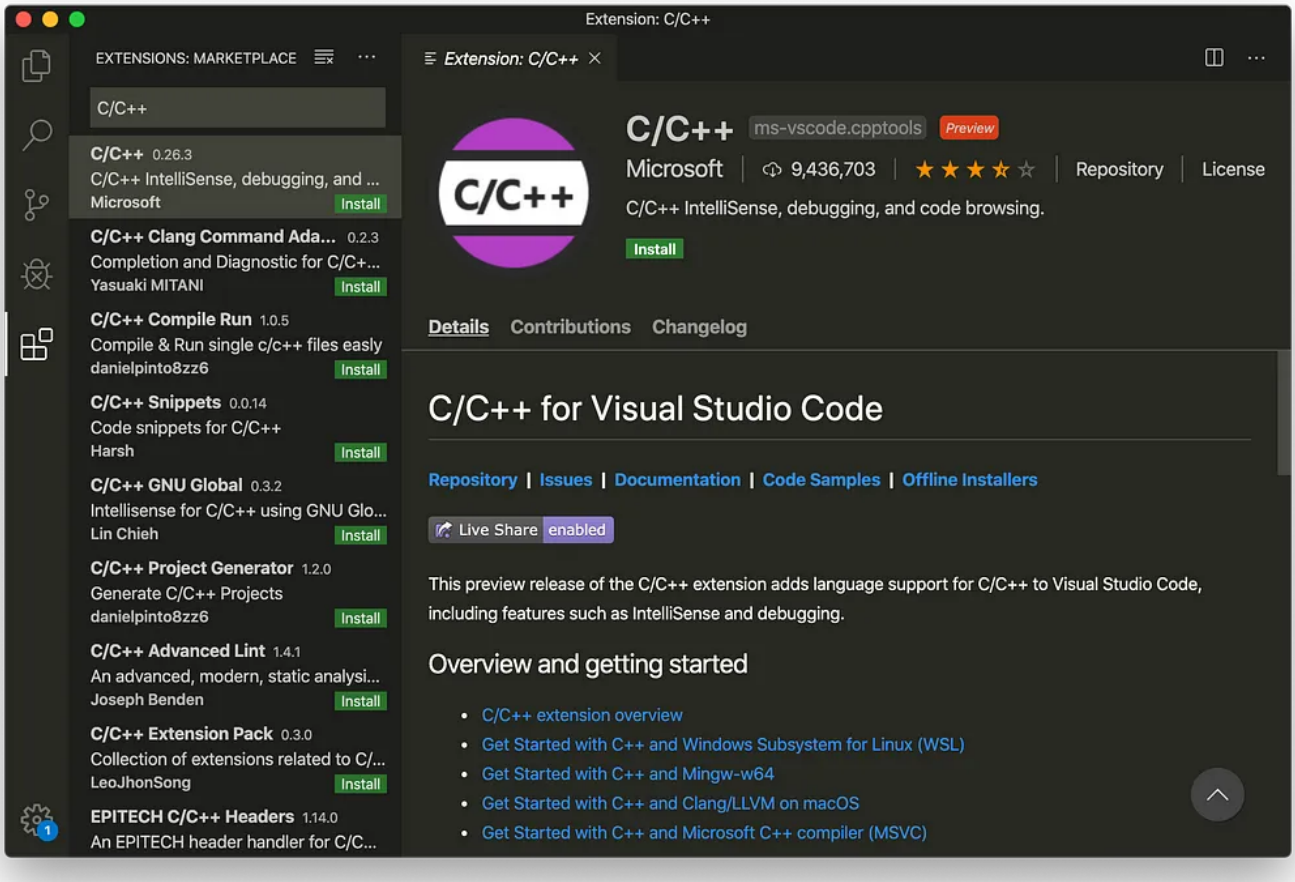
Hardware Requirements

- nRF52840-MDK development board
- 1x USB-C cable
- A Windows/macOS/Linux PC

Install Visual Studio Code

You need to install Visual Studio Code with the C/C++ extensions to begin.

1. Install Visual Studio Code.
2. Open Visual Studio Code, and click on the **Extensions** button.
3. Search for the C/C++ plugin (by Microsoft) and click **Install**.
4. When prompted, restart the IDE.



Install pyOCD

pyOCD is an open source Python package for programming and debugging Arm Cortex-M microcontrollers using multiple supported types of USB debug probes. It is fully cross-platform, with support for Linux, macOS, and Windows.

The latest stable version of pyOCD may be installed via pip as follows. **Skip** this step if pyOCD already exists.

```
pip install -U pyocd
```

Install GNU Arm Embedded Toolchain

Download and install the GNU ARM Embedded Toolchain. Then ensure the path is added to your OS PATH environment variable:

```
# in ~/.bash_profile, add the following script
export PATH="<path to install directory>/gcc-arm-none-eabi-6-2017-q2-update/bin:${PATH}"
```

Type the following in your terminal to verify if `arm-none-eabi-gcc` works:

```
arm-none-eabi-gcc --version
```

Configuring the debugger

The `launch.json` file is used to configure the debugger in Visual Studio Code. To configure the debugger for your project:

- Open the project folder in Visual Studio Code.
- Open the `.vscode/launch.json` file and add the example configurations:

```
{
    "version": "0.2.0",
    "configurations": [
        {
            "name": "C++ Launch",
```

```
            "type": "cppdbg",
            "request": "launch",
            "program":
"${workspaceRoot}/armgcc/_build/nrf52840_xxaa.out"
,
            "args": [],
            "stopAtEntry": true,
            "cwd": "${workspaceRoot}",
            "environment": [],
            "externalConsole": false,
            "debugServerArgs": "",
            "serverLaunchTimeout": 20000,
            "filterStderr": true,
            "filterStdout": false,
            "serverStarted": "GDB\\ server\\
started",
            "preLaunchTask": "make",
            "setupCommands": [
                { "text": "-target-select remote
localhost:3333", "description": "connect to
target", "ignoreFailures": false },
                { "text": "-file-exec-and-symbols
${workspaceRoot}/armgcc/_build/nrf52840_xxaa.out",
"description": "load file", "ignoreFailures":
false},
                { "text": "-interpreter-exec
console \"monitor endian little\"",
"ignoreFailures": false },
                { "text": "-interpreter-exec
console \"monitor reset\"", "ignoreFailures":
false },
                { "text": "-interpreter-exec
console \"monitor halt\"", "ignoreFailures": false
},
                { "text": "-interpreter-exec
console \"monitor arm semihosting enable\"",
"ignoreFailures": false },
                { "text": "-target-download",
"description": "flash target", "ignoreFailures":
false }
            ],
            "logging": {
```

```
                "moduleLoad": true,
                "trace": true,
                "engineLogging": true,
                "programOutput": true,
                "exceptions": true
            },
            "linux": {
                "MIMode": "gdb",
                "MIDebuggerPath": "arm-none-eabi-
gdb",
                "debugServerPath": "pyocd-
gdbserver"
            },
            "osx": {
                "MIMode": "gdb",
                "MIDebuggerPath": "arm-none-eabi-
gdb",
                "debugServerPath": "pyocd-
gdbserver"
            },
            "windows": {
                "preLaunchTask": "make.exe",
                "MIMode": "gdb",
                "MIDebuggerPath": "arm-none-eabi-
gdb.exe",
                "debugServerPath": "pyocd-
gdbserver.exe",
                "setupCommands": [
                    { "text": "-environment-cd
${workspaceRoot}\\armgcc\\_build" },
                    { "text": "-target-select
remote localhost:3333", "description": "connect to
target", "ignoreFailures": false },
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symbols nrf52840_xxaa.out", "description": "load
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console \"monitor endian little\"",
"ignoreFailures": false },
                    { "text": "-interpreter-exec
console \"monitor reset\"", "ignoreFailures":
false },
```

```
                    { "text": "-interpreter-exec
console \"monitor halt\"", "ignoreFailures": false
},
                    { "text": "-interpreter-exec
console \"monitor arm semihosting enable\"",
"ignoreFailures": false },
                    { "text": "-target-download",
"description": "flash target", "ignoreFailures":
false }
                ]
            }
        }
    ]
}
```

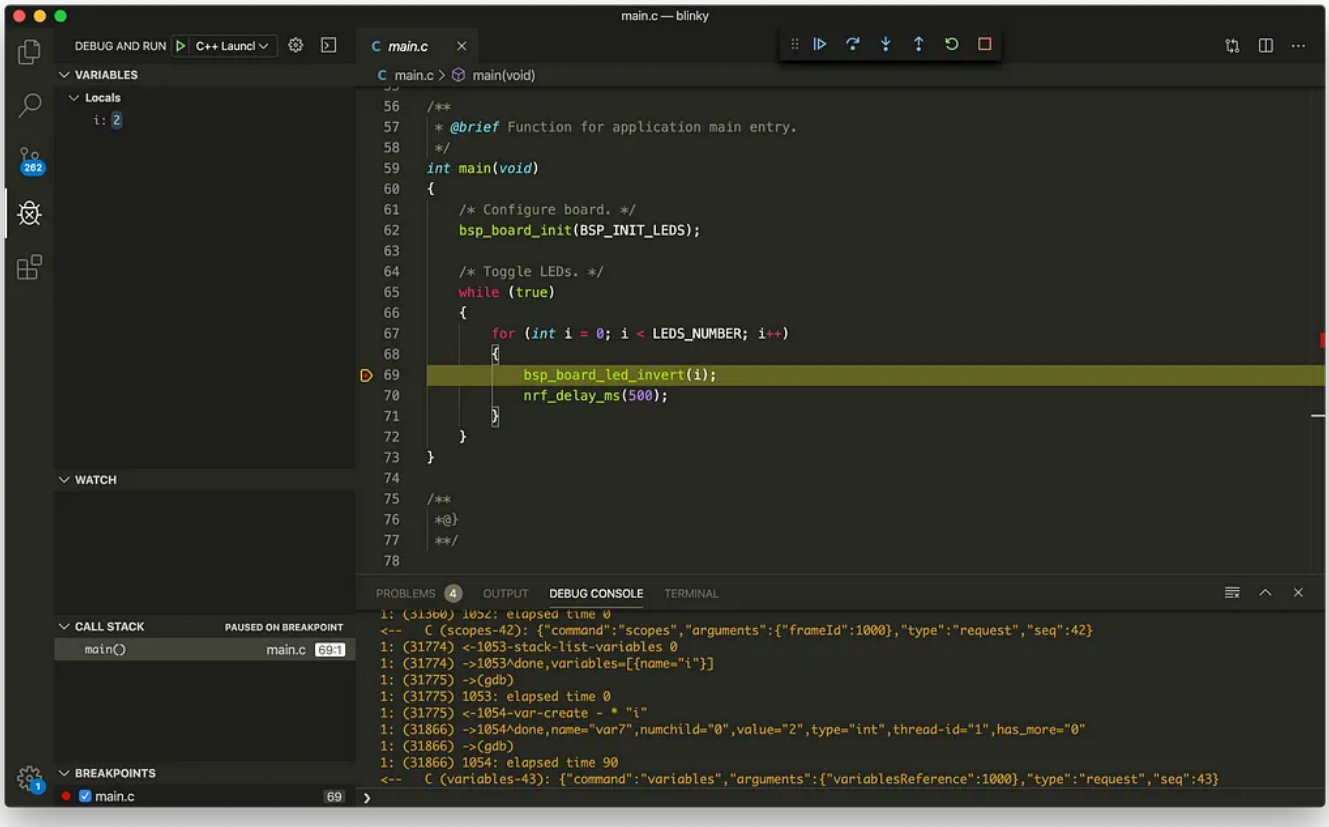
- Create a `make` task in `.vscode/tasks.json` file:


```
    "version": "2.0.0",
    "tasks": [
        {
            "label": "make",
            "options": {
                "cwd": "${workspaceRoot}/armgcc"
            },
            "problemMatcher": {
                "owner": "cpp",
                "fileLocation": ["relative",
"${workspaceRoot}"],
                "pattern": {
                    "regexp": "^(.*):(\\d+):
(\\d+):\\s+(warning|error):\\s+(.*)$",
                    "file": 1,
                    "line": 2,
```

```
                    "column": 3,
                    "severity": 4,
                    "message": 5
                }
            },
            "args": [],
            "linux": {
                "command": "make"
            },
            "osx": {
                "command": "make"
            },
            "windows": {
                "command": "make.exe"
            }
        }
    ]
}
```

Debugging your project

Connect the board to your PC, click **Debug** -> **Start Debugging** , and debugging starts. Click on the **Debug Console** tab to see the debug output:



Debugging Blinky example

Now you can explore the debugging capabilities for Variables, Breakpoints, and more.

Example Sources

The example project files are located in GitHub: https://github.com/makerdiary/nrf52840-mdk/tree/master/examples/nrf5-sdk/blinky

Reference

- VS Code Launch Json Reference
- VS Code Tasks Documentation

- nRF52840-MDK Documentation

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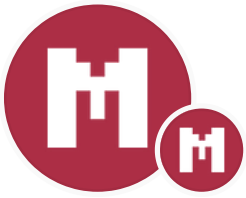

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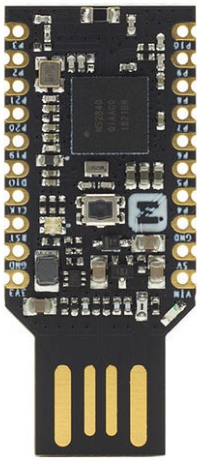

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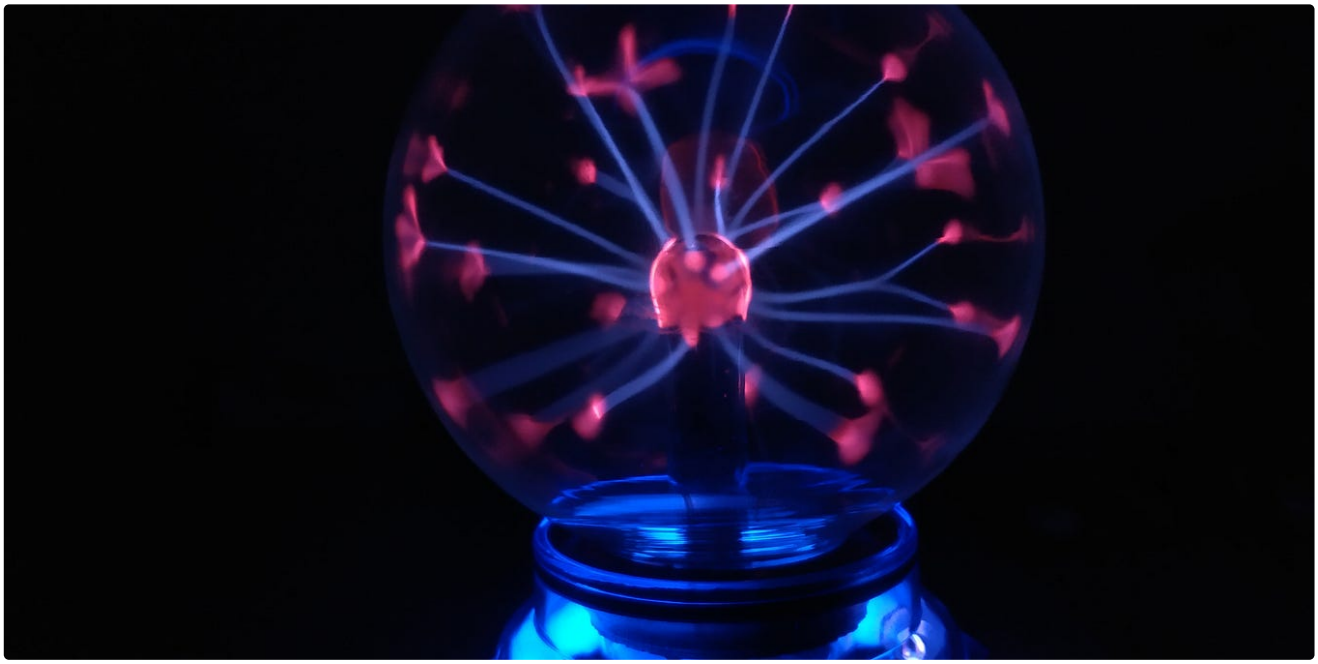

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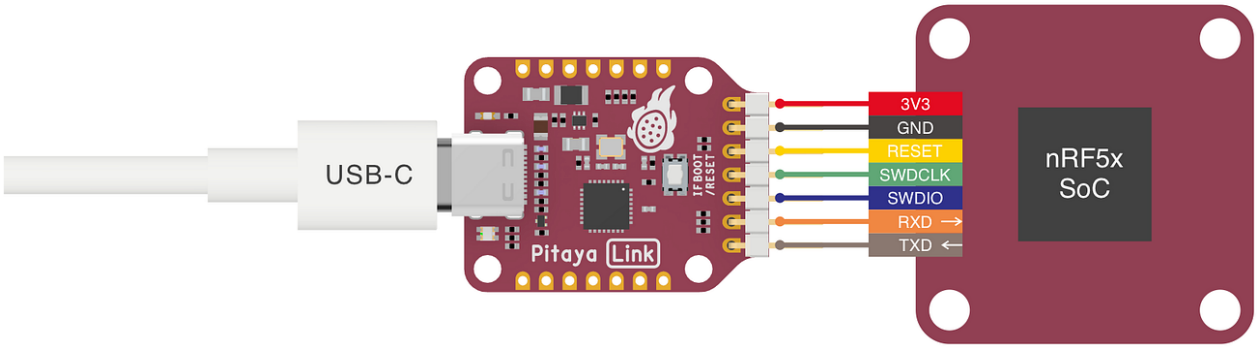

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```
commit ffcf2c01b7ef612893529cef188cc1961ed64521 (HEAD -> master, origin/master, origin/bors/staging, origin/HEAD)
Merge: fc991bf81 5159211da
Author: iohk-bors[bot] <43231472+iohk-bors[bot]@users.noreply.github.com>
Date:   Tue Nov 8 17:44:34 2022 +0000

    Merge #4563

    4563: New p2p topology file format r=coot a=coot

    Fixes #4559.


    Co-authored-by: Marcin Szamotulski <coot@coot.me>
    Co-authored-by: olgahryniuk <67585499+olgahryniuk@users.noreply.github.com>

commit fc991bf814891a9349f22cf278632d39b04d4628
Merge: 5633d1c05 5cd94d372
Author: iohk-bors[bot] <43231472+iohk-bors[bot]@users.noreply.github.com>
Date:   Tue Nov 8 13:07:58 2022 +0000

    Merge #4613

    4613: Update building-the-node-using-nix.md r=CarlosLopezDeLara a=CarlosLopezDeLara

    Build the cardano-node executable. No default configuration.

    Co-authored-by: CarlosLopezDeLara <carlos.lopezdelara@iohk.io>

commit 5159211da7a644686a973e4fb316b64ebb1aa34c
Author: olgahryniuk <67585499+olgahryniuk@users.noreply.github.com>
Date:   Tue Nov 8 13:25:10 2022 +0200
```

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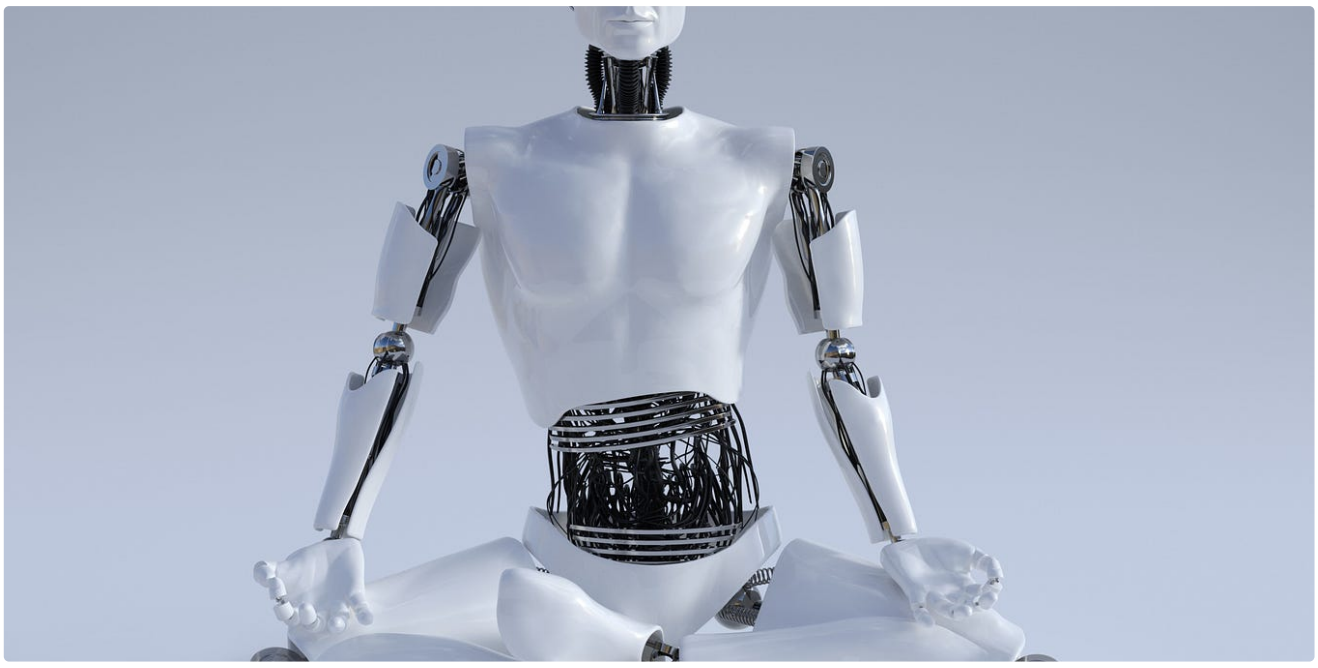

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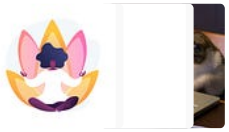

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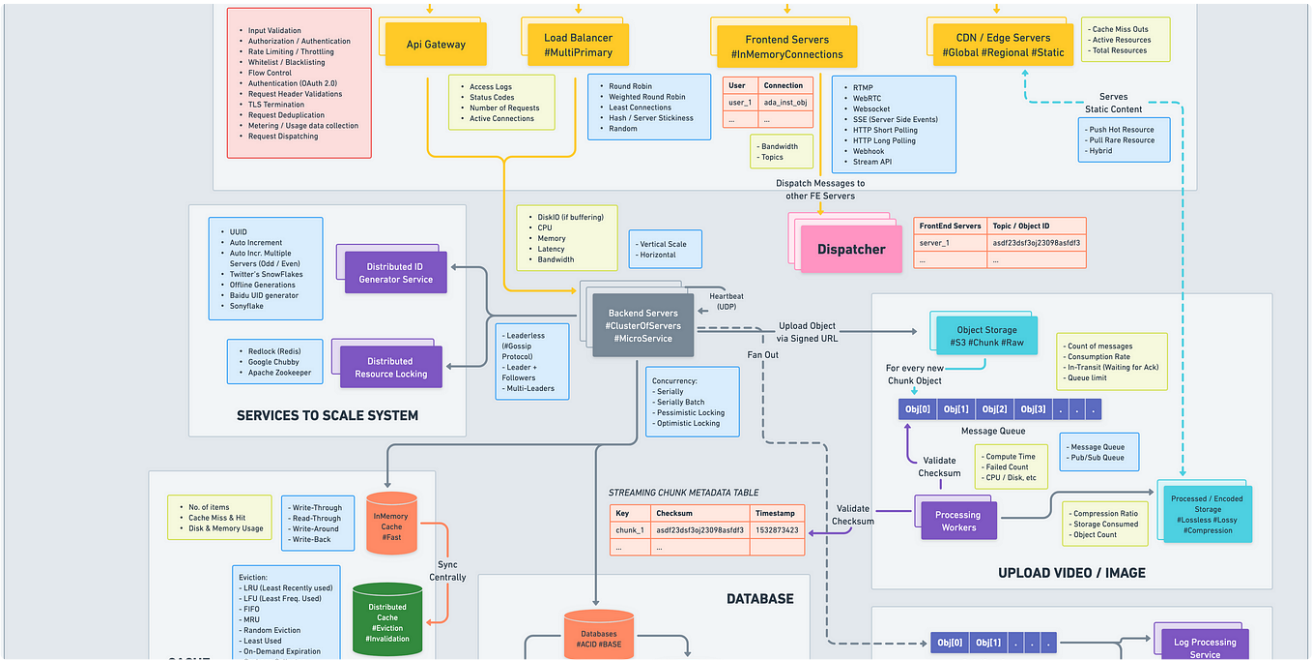

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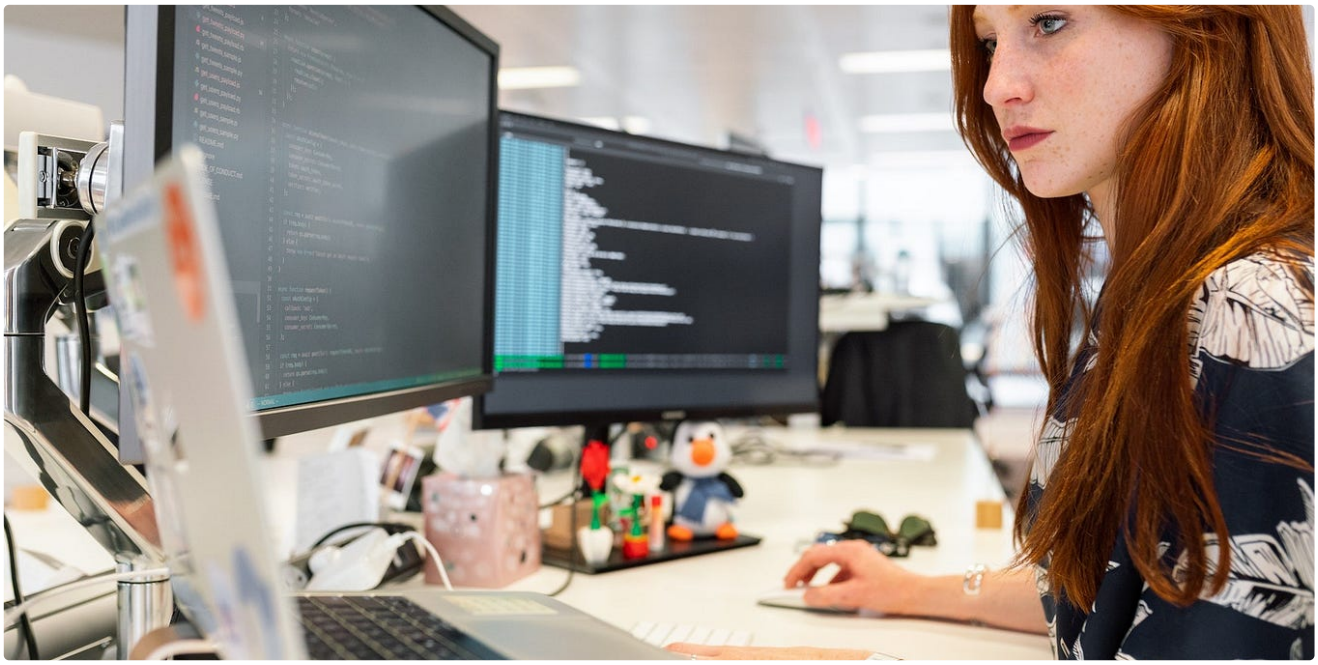

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