> [!NOTE]
> Tested on MacOS 15 Sequoia.
> MacOS 14 is not supported.

Vivado on macOS via Docker

This repository provides a solution to run Xilinx Vivado on macOS using Docker containerization.

Normal Vivado Workflow

The typical FPGA development workflow in Vivado consists of:

1. RTL Design (Verilog/VHDL)
2. Synthesis
3. Implementation
4. Generate Bitstream

Programming with Docker Limitation

When running Vivado in a container, direct hardware programming is not possible due to USB device access restrictions. To solve this, we use `openFPGALoader`:

1. Generate bitstream in containerized Vivado
2. Locate bitstream in your project directory (typically at `<project_name>/<project_name>.runs/impl_1/<top_level_module>.bit`)
3. Use `openFPGALoader` on host to program FPGA:

```
brew install openfpgaloader
openFPGALoader -b basys3 /path/to/project/<project_name>.runs/impl_1/<top_level_module>.bit
```

Note: Supported board names can be listed using `openFPGALoader -h`

Table of Contents

4. Troubleshooting

Prerequisites

0. **Disk Space**
    - Ensure you have at least 120GB of free disk space:
        - ~80GB for Vivado download and Extract (this space will be freed after installation)
        - ~40GB for program data
1. **Homebrew**
    - Install Homebrew by running:

      ```
      /bin/bash -c "$(curl -fsSL https://raw.githubusercontent.com/Homebrew/install/HEAD/inst
      ```

    - Follow any additional setup instructions provided by the installer
2. **Docker Desktop**
    - Install Docker Desktop for macOS from docker.com
    - Alternatively, install via Homebrew:

      ```
      brew install --cask docker
      ```

3. **XQuartz**
    - Install via Homebrew:

      ```
      brew install --cask xquartz
      ```

    - After installation, restart your computer
    - Open XQuartz and enable "Allow connections from network clients" in XQuartz preferences
    - Navigate to XQuartz -> Settings -> Security -> Allow connections from network clients
4. **Vivado Installer**
    - Download Vivado installer for Linux from AMD/Xilinx website

Installation

1. **Get the Repository**

   ```
   git clone https://github.com/yokeTH/vivado-mac.git
   # or download and extract the ZIP file
   ```

2. **Run Setup Script**

```
cd vivado-mac
./scripts/setup.sh
```

3. **Install Vivado**
   - When prompted, drag and drop the downloaded `Vivado installer` (from prerequisites no.4) into the terminal
   - Follow the installation instructions in the Vivado installer
   - Select desired Vivado components

Usage

0. **Ensure Display Setup**
   - Check X11 Display Issues if you encounter problems
   - XQuartz must be running before starting Vivado
1. Start XQuartz

```
xhost + localhost
```

2. Launch Vivado container:

```
./scripts/start_container.sh
```

3. Vivado GUI will appear in XQuartz window

Troubleshooting

Common Issues

1. **X11 Display Issues**
   - Ensure XQuartz is running
   - In XQuartz preferences:
     - Go to Security tab
     - Check "Allow connections from network clients"
   - Try restarting XQuartz
   - Run `xhost + localhost` before starting container
2. **For permission issues**, ensure setup script has executable permissions (`chmod +x scripts/setup.sh`)

3. **100 Killed Error**
   If you encounter the following error while using version `2024.2`:

   ```
   100 Killed ${X_JAVA_HOME} /bin/java ${ARGS} -cp ${X_CLASS_PATH}    comxilinx.installerapi.I
   ```

   remove the Xilinx folder and try using version 2023 instead.

License

This project is licensed under the BSD 3-Clause License - see the LICENSE file for details.

Vivado License

Vivado requires a license from AMD/Xilinx. Please obtain appropriate licensing from AMD/Xilinx website.

Disclaimer

This repository only provides the environment setup to run Vivado on Apple Silicon Macs via Docker. It does not include Vivado software itself. Users must:

- Download Vivado separately from AMD/Xilinx
- Comply with AMD/Xilinx's licensing terms
- Use at their own risk