



StarFive
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VisionFive Node.js Application

Application Note

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Legal Statements

Important legal notice before reading our documentation.

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Preface

About this guide and technical support information.

About this document

This document mainly provides the users with the necessary information to:

- install Node.js in the VisionFive Fedora system.
- play the BrowserQuest, a multiplayer RPG game, on your personal device with VisionFive as the server.






Revision History

Table 0-1 Revision History

Version	Released	Revision
V1.0	2021-01-27	The first official release.

Notes and notices

The following notes and notices might appear in this guide:

-  **Tip:**
Suggests how to apply the information in a topic or step.
-  **Note:**
Explains a special case or expands on an important point.
-  **Important:**
Points out critical information concerning a topic or step.
-  **CAUTION:**
Indicates that an action or step can cause loss of data, security problems, or performance issues.
-  **Warning:**
Indicates that an action or step can result in physical harm or cause damage to hardware.

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1. Introduction

This document mainly provides the users with the necessary information to:

- install Node.js in the VisionFive Fedora system.
- play the BrowserQuest, a multiplayer RPG game, on your personal device with VisionFive as the server.

2. Preparation

Make sure you have prepared the following items.

2.1. Required Hardware

You need to prepare the following hardware items:

- VisionFive
- Micro-SD card (16 GB or more)
- PC with Linux OS
- USB to Serial Converter
- Ethernet cable
- Power adapter
- USB Type-C cable

2.2. Preparing Software

Flashing Fedora OS to a Micro-SD Card

Now we need to burn Fedora (which is a Linux distribution) to a micro-SD card so that it can run on the VisionFive. Follow the steps in the *Flashing Fedora OS to a Micro-SD Card* section in the *VisionFive Single Board Computer Quick Start Guide*.

Preparing RISC-V Toolchain

To build Node.js for RISC-V, make sure you have the RISC-V toolchain installed. To install, perform the following:

1. Install prerequisites by running:

```
sudo apt install gawk texinfo zlib1g-dev
```

2. Build the risc64-gnu toolchain by running:



Note:

Follow the steps below to install the RISC-V toolchain. There is nothing modified in the standard toolchain, so if you already have this installed, you can skip this step.

```
git clone https://github.com/riscv/riscv-gnu-toolchain
cd riscv-gnu-toolchain
```




```
git submodule update --init --recursive
./configure --prefix=/opt/riscv
sudo make linux -j8
```

`-j8` specifies parallel build with 8 processes, and should be adjusted to the number of cores on your machines.

3. Be sure to add the path to this new toolchain to your path:

```
export PATH="/opt/riscv/bin:$PATH"
```

Building Node.js

Perform the following steps to build Node.js on Ubuntu host machine:

1. Install prerequisites:



Note:

The following script will use apt to install any packages required for building Node.js. You will need sudo access to install the packages.

```
git clone https://github.com/nodejs/node.git
cd node
git checkout v17.1.0
```

2. Run the following to fix some C++ conformance issues in V8 source files which may cause build errors.

```
CC=riscv64-unknown-linux-gnu-gcc CXX=riscv64-unknown-linux-gnu-g++
CC_host=gcc CXX_host=g++ ./configure --dest-cpu=riscv64
--cross-compiling --dest-os=linux --openssl-no-asm
```



Note:

We pass the `--openssl-no-asm` option to the configure because asm support in OpenSSL for riscv64 architecture is not available yet. It means the crypto operations in Node.js will be slightly slower without the use of assembly instructions in crypto operations.

Refer to:

<https://github.com/nodejs/node/blob/master/deps/openssl/config/Makefile#L18>>

This will generate the Makefiles in the out folder.

3. Set the environment by running:

```
cd out/tools/v8_gypfiles
find . -type f -name "*.mk" -print0 | xargs -0 sed -i
's/gnu++17/gnu++14/g'
```

4. Replace all `gnu++17` with `gnu++14` in `out/tools/v8_gypfiles/*.mak`.



Note:

This is to avoid building C++17 compatibility errors in:

<https://github.com/nodejs/node/blob/master/deps/v8/src/torque/earley-parser.h#L251>

Compiling

If you want to compile the files by yourself, perform the following:

1. Download [0001-build-issue-fixes.patch](#) to your desired directory.
2. Execute the following to compile:

```
patch -p1 < 0001-build-issue-fixes.patch
ulimit -n 65535
make -j4 && make install PREFIX=./install
```



Note:

- Start the build and install the built binaries to the install folder under the Node.js root source folder.
- Use `-jX` option to make multiple threads parallel.

Verification

To verify that whether Node.js libs are compiled successfully:

1. Install Node.js into the Ubuntu system:

```
cd ./install
ls -l
```

Result:

```
drwxrwxr-x 2 riscv riscv 4096 Nov 18 10:23 bin
drwxrwxr-x 3 riscv riscv 4096 Nov 18 10:23 include
drwxrwxr-x 3 riscv riscv 4096 Nov 18 10:32 lib
drwxrwxr-x 5 riscv riscv 4096 Nov 18 10:34 share
```

2. Copy the compiled files of this folder into `/usr/local/` under Fedora system of VisionFive.

The compiled file directories generated in the previous section include:

- `bin`
- `include`
- `lib`
- `share`

3. Install Node.js on VisionFive Fedora

Execute the following to install Node.js into the Fedora system on VisionFive:

1. Execute the following to install Node.js into the VisionFive System:

```
sudo dnf -y update
sudo dnf -y install redis
sudo systemctl enable --now redis
```

2. Execute the following on VisionFive Fedora to check the path:

```
which node
```

Example Result:

```
/usr/local/bin/node
```

3. Execute the following to check the version:

```
node -v
```

Example Result:

```
v17.1.0
```

4. Execute the following to check the NPM version:

```
npm -v
```

Example Result:

```
8.1.2
```

4. Node.js Example: Using VisionFive as Multiplayer RPG Game Server

Through this Node.js example program, you can play the BrowserQuest on your personal device with VisionFive as the server. BrowserQuest is a multiplayer RPG game inviting you to explore a world of adventure from your Web browser.

Prerequisite:

Make sure Node.js and NPM can run on the Fedora system before installing the example.

To install and run the Node.js example program, perform the following

1. Install the Redis by running:

```
sudo dnf -y update
sudo dnf -y install redis
sudo systemctl enable --now redis
```

2. Install BrowserQuest by running:

```
cd ~
git clone https://github.com/JeremyAngCH/BrowserQuest.git
cd BrowserQuest
npm install
```

3. Disable the firewall temporarily by running:

```
sudo systemctl stop firewalld
```

4. Run the BrowserQuest by executing:

```
node server/js/main.js
```

5. Connect to the game server (VisionFive) by accessing the following URL through Chrome on your PC/tablet/smartphone:

```
http://<Your_VisionFive_Board_IP>:8082
```



Note:

- <Your_VisionFive_Board_IP> refers to the IP of your VisionFive board.
- When you log in for the first time, you will be asked to register (email address is optional).

Result:

Figure 4-1 BrowserQuest Login Interface



Figure 4-2 BrowserQuest Example Interface



Figure 4-3 BrowserQuest Example Interface



Figure 4-4 VisionFive Output

```
[Fri Jan 14 2022 15:12:55 GMT+0800 (China Standard Time)] INFO HURT: dd 1322
[Fri Jan 14 2022 15:12:56 GMT+0800 (China Standard Time)] INFO HIT: dd 1322
[Fri Jan 14 2022 15:12:56 GMT+0800 (China Standard Time)] INFO HURT: dd 1322
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] INFO HIT: dd 1322
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] INFO HURT: dd 1322
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] INFO HIT: dd 1322
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] ERROR Unknown entity : null
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] INFO Set Exp: dd 5
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] INFO HURT: dd 1322
[Fri Jan 14 2022 15:12:57 GMT+0800 (China Standard Time)] ERROR Unknown entity : 1322
[Fri Jan 14 2022 15:13:00 GMT+0800 (China Standard Time)] INFO LOOTMOVE: dd(7, 228)
[Fri Jan 14 2022 15:13:00 GMT+0800 (China Standard Time)] INFO LOOT: dd 936
[Fri Jan 14 2022 15:13:02 GMT+0800 (China Standard Time)] INFO ATTACK: dd 1321
[Fri Jan 14 2022 15:13:02 GMT+0800 (China Standard Time)] INFO HIT: dd 1321
[Fri Jan 14 2022 15:13:02 GMT+0800 (China Standard Time)] INFO HURT: dd 1321
[Fri Jan 14 2022 15:13:03 GMT+0800 (China Standard Time)] INFO HIT: dd 1321
[Fri Jan 14 2022 15:13:03 GMT+0800 (China Standard Time)] INFO HURT: dd 1321
[Fri Jan 14 2022 15:13:03 GMT+0800 (China Standard Time)] INFO HIT: dd 1321
[Fri Jan 14 2022 15:13:04 GMT+0800 (China Standard Time)] INFO HURT: dd 1321
[Fri Jan 14 2022 15:13:04 GMT+0800 (China Standard Time)] INFO HIT: dd 1321
[Fri Jan 14 2022 15:13:05 GMT+0800 (China Standard Time)] INFO HURT: dd 1321
[Fri Jan 14 2022 15:13:05 GMT+0800 (China Standard Time)] INFO HIT: dd 1321
[Fri Jan 14 2022 15:13:05 GMT+0800 (China Standard Time)] ERROR Unknown entity : null
[Fri Jan 14 2022 15:13:05 GMT+0800 (China Standard Time)] INFO Set Exp: dd 10
```