Docker on Mobile, that too without root, How?

Kumar Gaurav Pandey · Follow
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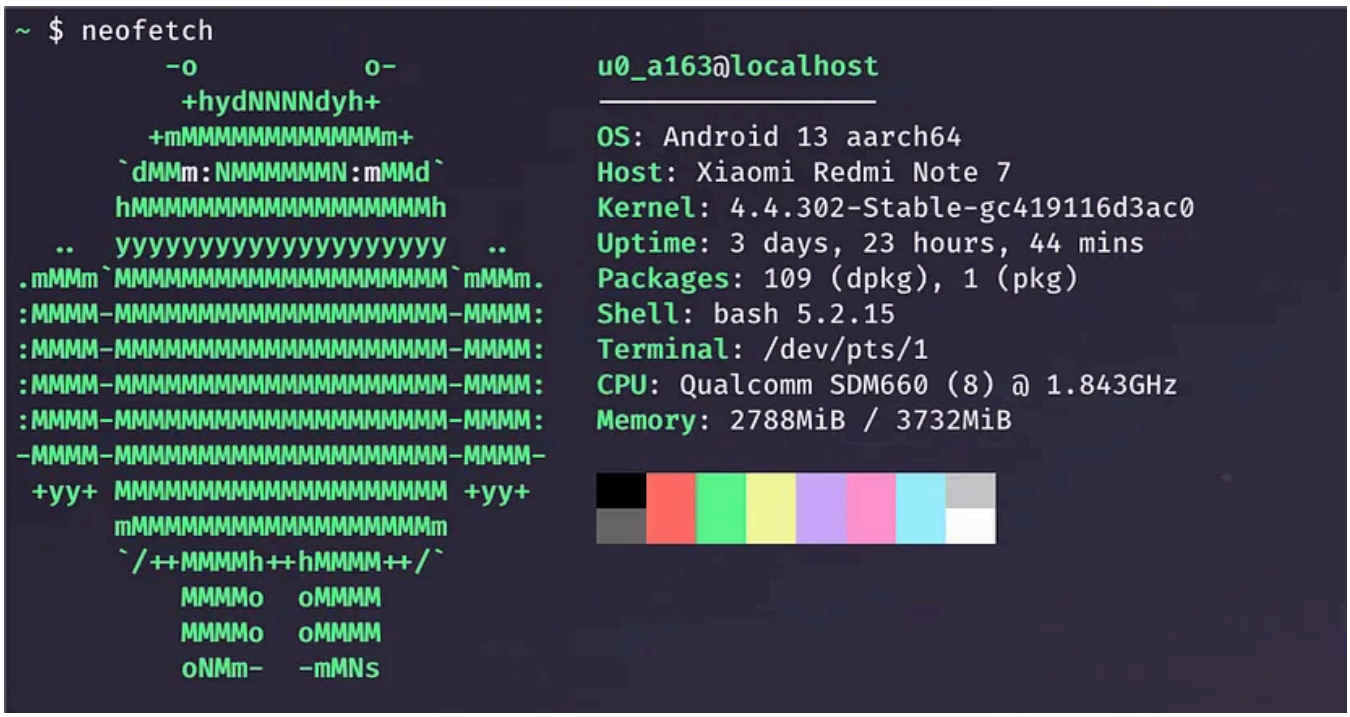
As a DevOps engineer by day, and a Hardware Hacker by night, My mind decided, why not combine two?
Looking for challenges I started with the most basic yet most powerful tool in DevOps, **Docker.**
I recently rooted (**you don't need to be rooted to run docker though**) my old android phone to run some new ROM on it (PixelOS, if you are wondering). It is an old 2019 Redmi Note 7, with following specs:



(The above configuration might be slightly different because I am running custom kernel as well as custom ROM on my device)

So I decided start with running docker on my mobile, but is it even possible ? Let's dive in and see.

Step 0: Getting SSH access

(This is an optional step, if you don't want to work on a computer it is perfectly fine. skip to step 1)

Let's start with acquiring SSH access into our phones, so it easier for us to work with bigger screen and full sized keyboard.

To get started you will need a terminal emulator, I will be using Termux, you can use whichever feels convenient to you.

Let's get started by updating our system:

```
pkg update && pkg upgrade
```

After this we will be installing some tools needed for ssh,

```
pkg install openssh git curl wget
```

you will be prompted for inputs, just type 'y' and press return.

after everything is installed we will need to find our IP to ssh into and our username.

now before you start typing your ssh commands, make sure to run this command

```
sshd
```

to find username:

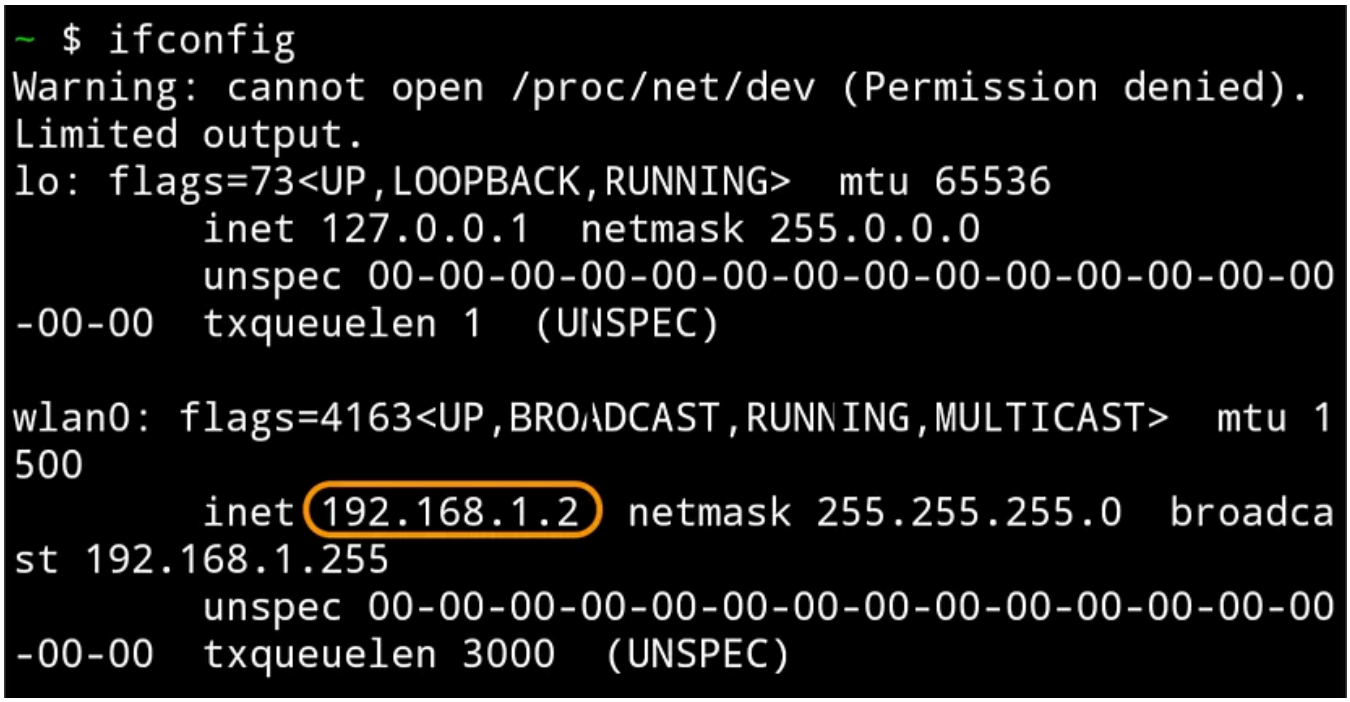
```
whoami
```

username for ssh **(u0_a163)**

and to find ip of our android device we will be running:

```
ifconfig
```

we will get some output which might look confusing, fear not.
The highlighted part is the one which we will use to ssh

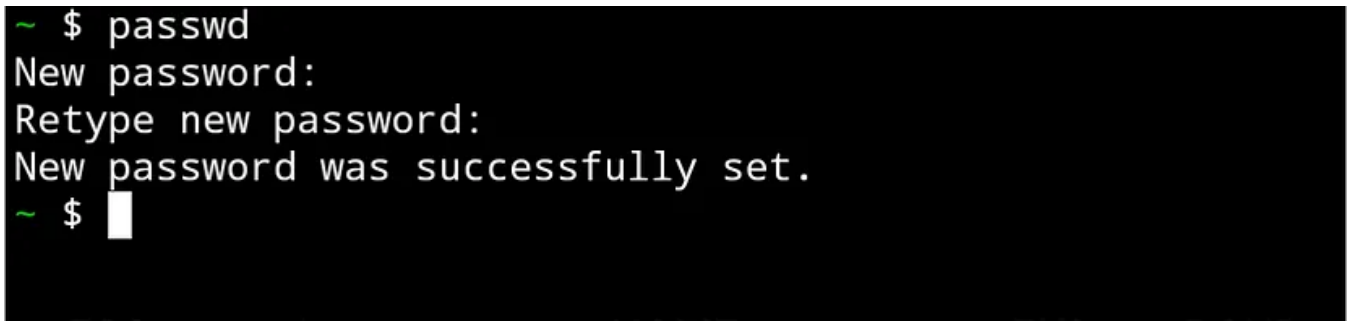


IP for ssh

we will need a password to login into ssh, so set a new password using the command

```
passwd
```

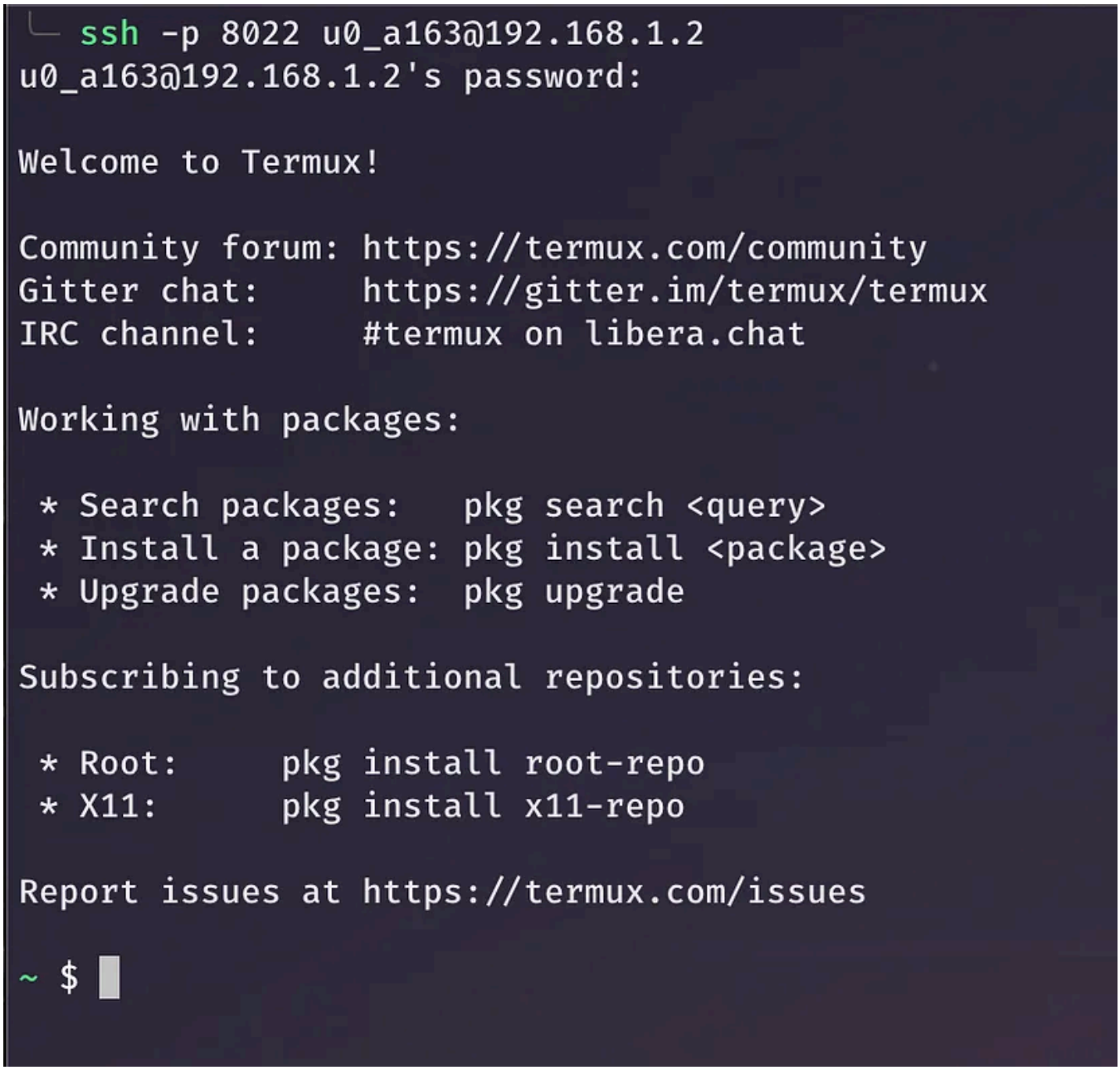
we will be prompted for password (it will be invisible even if we type), make sure to remember the password to login into ssh.



Now we will make sure, both of our devices are connected to the same network.

Let’s ssh into our mobile using the credentials we acquired.

```
ssh -p 8022 <username>@<ip>
```



seems familiar, right?

Step 1: Installing Docker

We will need to install something called “**root-repo**”, this allows us to add repository to download Docker.

```
pkg install root-repo
```

after running this command, we can go ahead and install docker via this command:

```
pkg install docker
```

you might notice a “**NOTE**”

```
NOTE: Docker requires the kernel to support
device cgroups, namespace, VETH, among others.
```

running the command:

```
docker version
```

gives us following results:

but what is the last line?

```
unix:///data/data/com.termux/files/usr/var/run/docker.sock.
Is the docker daemon running?
```

it means our docker daemon is not running.

If we were rooted we will go towards Kernel Level tweaking but since we are running non-root device, we will have to connect the docker.sock running on another device to our device.

Step 2: Installing a VM

I have already written a long article on how to install VMs on Android using termux, you can follow it here to install VM and come back and proceed to step 3.

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Step 3: Connecting Docker via VM

Now we can login into our alpine installation using the `alpine.sh` file we created in step 3.

To install Docker in the VM we will need to add `community` alpine package repo. To add this we will need to edit `/etc/apk/repositories` file:

```
vi /etc/apk/repositories
```

There will be 3 lines in the given file, we will remove the # before the 3rd line (line ending with `/community`)

after this we will need to update our package source:

```
apk update
```

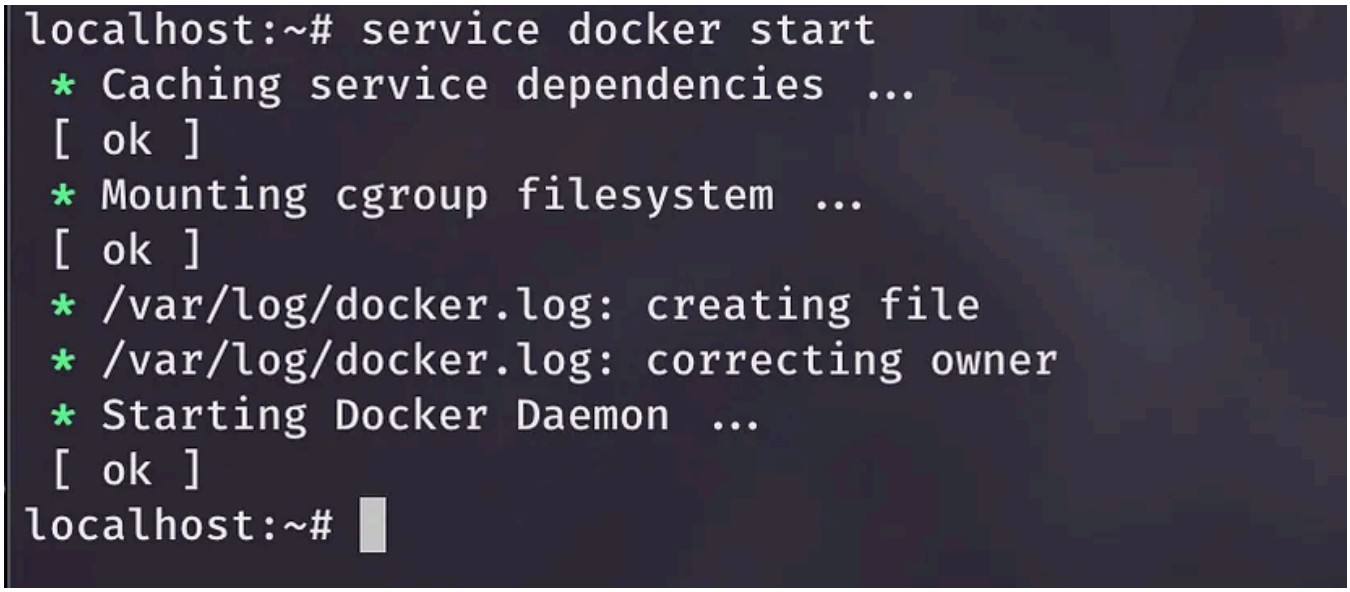
We will now download Docker using this command:

```
apk add docker
```

Now, since our docker is installed, we will use following command to start the docker service:

```
service docker start
```

you will see output like this. This means our docker installation is working on VM.



Now we will switch back to our regular termux (you can use `poweroff` command then `exit`).

We will need to replace the current content of `alpine.sh` to following:

```
qemu-system-x86_64 -m 512 -netdev user,id=n1,hostfwd=tcp::2222-:22,hostfwd=tcp:
```

In the above script we have just added the line `hostfwd=tcp::2375-:2375` , this is just forwording the port 2375 from VM to our Host system.

Now we will login into VM using the new `alpine.sh` script.

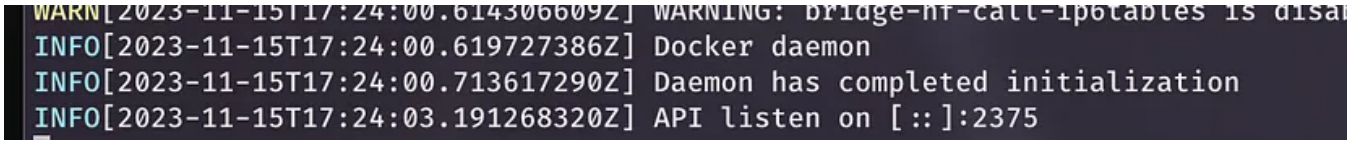
We will execute following command into the VM.

```
docekrd -H tcp://0.0.0.0:2375 --iptables=false
```

this command starts the Docker daemon, configures it to listen on all available interfaces on port 2375 for API requests, and disables the automatic management of iptables rules.

(remember to start docker service before running above command)

We will wait for the process to complete, and we will get output like this, this means our docker daemon is running fine

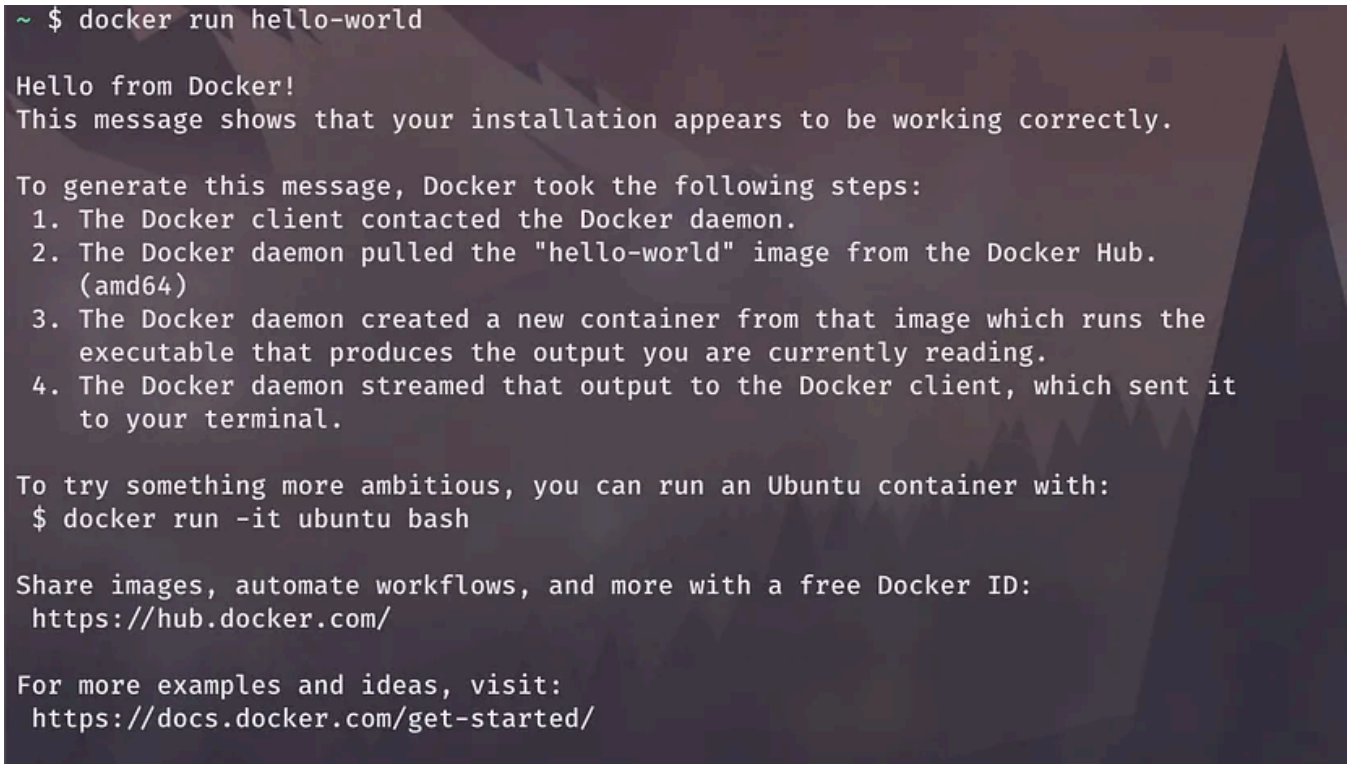


Now, without closing the old terminal, we will start a new ssh session and write the following command to let our termux know that Docker daemon is running on `localhost:2375` .

```
export DOCKER_HOST=localhost:2375
```

we can check if the docker is working by running the hello-world image using the following command

```
docker run hello-world
```



now we will be able to run any docker image which supports the architecture.

Congratulations 🚀, you just started docker on your phone. possibilities are endless now.

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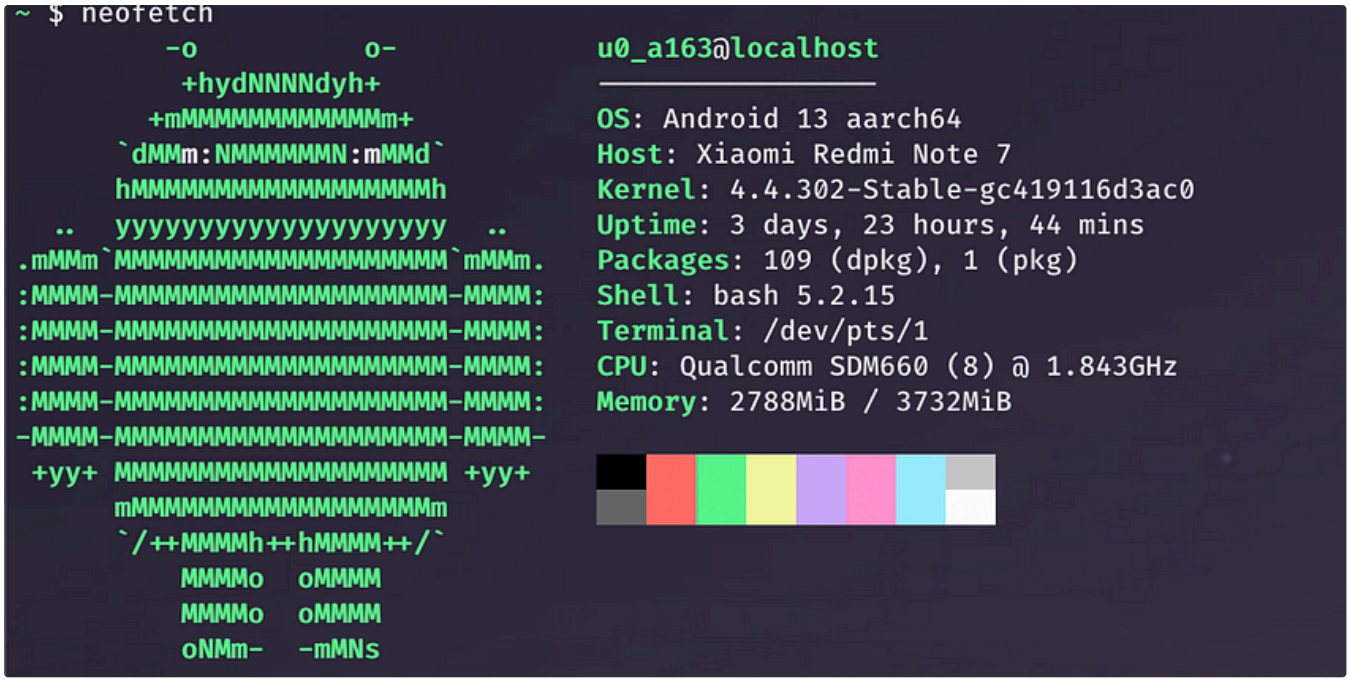

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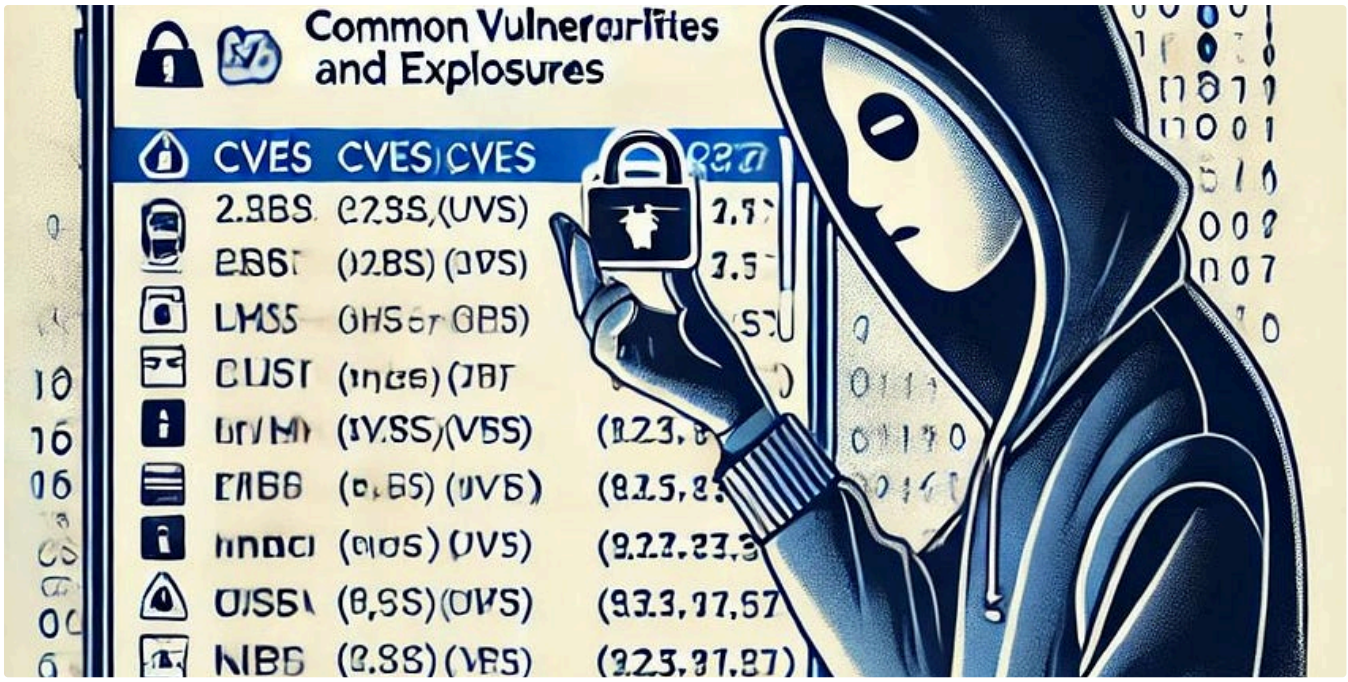

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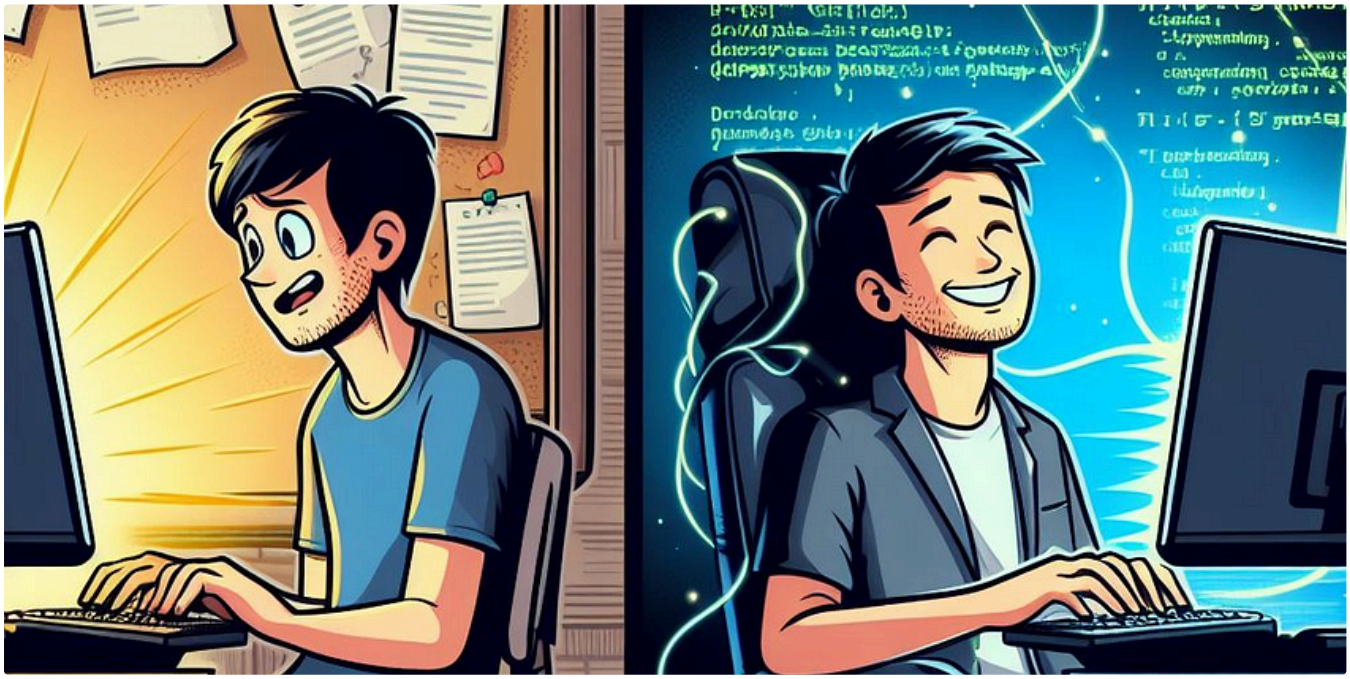

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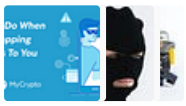

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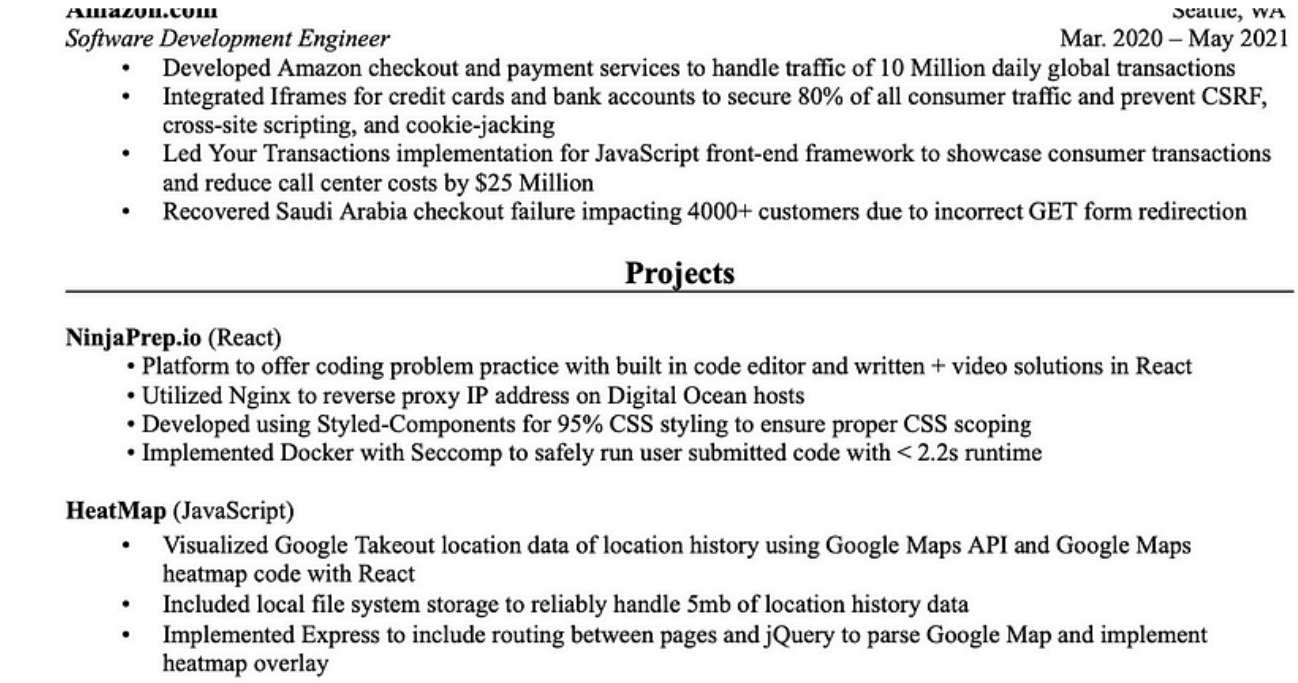

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Software Development Engineer Mar. 2020 – May 2021

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- Integrated Iframes for credit cards and bank accounts to secure 80% of all consumer traffic and prevent CSRF, cross-site scripting, and cookie-jacking
- Led Your Transactions implementation for JavaScript front-end framework to showcase consumer transactions and reduce call center costs by $25 Million
- Recovered Saudi Arabia checkout failure impacting 4000+ customers due to incorrect GET form redirection

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- Platform to offer coding problem practice with built in code editor and written + video solutions in React
- Utilized Nginx to reverse proxy IP address on Digital Ocean hosts
- Developed using Styled-Components for 95% CSS styling to ensure proper CSS scoping
- Implemented Docker with Seccomp to safely run user submitted code with < 2.2s runtime

HeatMap (JavaScript)
- Visualized Google Takeout location data of location history using Google Maps API and Google Maps heatmap code with React
- Included local file system storage to reliably handle 5mb of location history data
- Implemented Express to include routing between pages and jQuery to parse Google Map and implement heatmap overlay

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