FreeNAS and bhyve

Where the shark bites the hive

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Agenda

- Who am I?
- FreeNAS and bhyve architecture
- FreeNAS and bhyve in numbers
- FreeNAS new UI
- devel/libhyve-remote
- devel/bhyve-vm-goagent
- WIP: bee prepared
About me

- Name: Marcelo Araujo
- FreeBSD ports bit since 2007
- FreeBSD src bit since 2015
- Working for iXsystems Inc. since December/2016
- Github: araujobsd
- Interested in bhyve since 2014
FreeNAS and bhyve Architecture

1. UI WebSocket/Rest calls to middleware
2. Middleware provides WebSocket and primary functionality
3. Provides methods related to VMs and interactions with the userland
4. Userland: bhyve, bhyvectl, grub-bhyve...
What we want to achieve?

- Allow FreeNAS/TrueNAS to provide a hybrid storage solution
- Offer more alternatives to Jails for FreeNAS users
- Provide users a friendly virtualization experience
- Easy to use and intuitive UI, removing bhyve complexities
- Provide more external tooling for user VM management
FreeNAS and bhyve by the numbers

- FreeNAS has 10+ Million downloads and over 200K active users
- FreeNAS Forum has 61,012 users
  - 2,200 posts only related with bhyve
- We introduced the VM feature in February of 2017
- bhyve officially available on FreeNAS 11.0
- From that point to the present, 244 bhyve-related bugs have been reported
- 21 bugs related to VNC support alone

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FreeNAS new UI

- New UI made with Angular
- VM Wizard: Six steps to create a VM
- Friendly and intuitive UI
- Access VMs with VNC Web interface
- Flip Cards that are awesome
- … and more to come
FreeNAS new UI: VM List
FreeNAS new UI: Wizard
FreeNAS new UI: Graphs
FreeNAS new UI: VNC Web
devel/libhyve-remote

- A library that aims to abstract functionality from other third party libraries such like libvncserver, freerdp and spice
- Uses a dynamic linker, loads only functionality from other libraries that are necessary to launch the service
- Created mainly to solve some bugs we had with VNC implementation reported on FreeNAS
- Now we only support libvncserver
Some issues that libhyve-remote solves with VNC:

- Better compatibility with different VNC clients
- IPv6 support
- Non-US keyboard
- Better cursor handler
- Fewer glitches updating screen
- Better compression
- Password authentication (It is already in the RFB implementation)
devel/libhyve-remote

- How to use it with bhyve?
  - cd /usr/ports/devel/libhyve-remote
  - make config, select BHYVE
  - libhyve-remote is installed, and bhyve is patched, rebuilt, and reinstalled
  - If something goes wrong, it falls back to RFB bhyve implementation ;)
  - Launch bhyve with the new option, ex.:

```
  -s 29,fbuf,vncserver,....
```
devel/bhyve-vm-goagent

- An agent in Go that runs inside a guest vm and allows host hypervisor to obtain information from guest VMs
- Supports virtio-console and WebSocket protocol
- Pre-built binaries, i386 & amd64, for FreeBSD, Linux, NetBSD and Windows
- Information available from guest VM: mem, cpu, nics, uptime and ping
- Easily extended to do anything else
devel/bhyve-vm-goagent

- **How to use:**
  - **Host:**
    - Launch the guest VM with the virtio-console parameter:

```
-s 2,virtio-console,org.freenas.bhyve-agent=/tmp/FreeBSD12.sock
```

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devel/bhyve-vm-goagent

How to use:

Guest:

- Download the binary compatible with your guest OS
- From inside your VM:

```
kldload virtio_console
./bhyve-vm-goagent-freebsd-386 -virtio
```
How to obtain guest information:

Host:

- We provide tools like goserial

```
root@freenas:/tmp # ./goserial -socket="/tmp/FreeBSD12.sock" -ether -uptime
Result:
[{
  "mtu": 1500,
  "name": "em0",
  "hardwareaddr": "00:a0:98:1e:c0:08",
  "flags": ["up", "broadcast", "multicast"],
  "addr": [{"addr": "192.168.100.193/24"}]
},
{
  "mtu": 16384,
  "name": "lo0",
  "hardwareaddr": "",
  "flags": ["up", "loopback", "multicast"],
  "addr": [{"addr": ::1/128},
    {"addr": "fe80::1/64"},
    {"addr": "127.0.0.1/8"}]
}]
Result: {"seconds": 5742, "days": 0, "hours": 1, "minutes": 35}
```
WIP: bee prepared

- A new tool for manage bhyve will come this year
- Improve bhyve-vm-goagent
- Extend libhyve-remote to support at least freerdp
References:

- **libhyve-remote:**
  - GitHub: [https://github.com/freenas/libhyve-remote](https://github.com/freenas/libhyve-remote)
  - Review: [https://reviews.freebsd.org/D11768](https://reviews.freebsd.org/D11768)
  - Ports: devel/libhyve-remote

- **bhyve-vm-goagent:**
  - GitHub: [https://github.com/freenas/bhyve-vm-goagent](https://github.com/freenas/bhyve-vm-goagent)
  - Ports: devel/bhyve-vm-goagent
Thank you!