



Browser-based RDP, VNC, and SSH Access Using Guacamole

Do you want VMs with that?

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Introduction

Where and How we use Bhyve

- \$DAYJOB: Big Data Cluster administration at the Computer Science department of the University of Applied Sciences, Darmstadt, Germany
- Used in data science course of studies: teaching, projects, thesis, and research around Big Data and NoSQL databases

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- \$DAYJOB: Big Data Cluster administration at the Computer Science department of the University of Applied Sciences, Darmstadt, Germany
- Used in data science course of studies: teaching, projects, thesis, and research around Big Data and NoSQL databases
- Big demand for lab machines in summer '16 forced us to use bhyve as we had not enough cluster nodes for students
 - All running on ZFS with `volmode=dev` and LZ4 compression
 - No performance measurements were done as part of the lab
- Winter semester 16/17: Big Data Analytics lab with same bhyve setup had similar positive results
- We are generally happy with the resource use and stability of bhyve

The Hardware We Use

- 40 Nodes, Dell C6320 and C6220 machines
- Intel Xeon E5 2609, 2620, and 2695 CPUs
- Memory ranges between 32 GB and 128 GB
- 2 machines with 2 NVIDIA CUDA GPUs each
- 4x 1 TB SAS disks in each node, a few with SSDs



Client Issues

- A lot of different clients for various target machines
- Lab machines and student laptops need RDP, VNC, and SSH (Putty) clients installed to get access to cluster machines
- We want to make access as easy as possible so that students can focus on their lab work

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- In February '17, our CS department's IT migrated from VMware ESXi to Proxmox
 - A lot of issues with the SPICE protocol, did not work on my machine
 - no snapshot as VM users (coming soon™)
 - 320x200 resolution as serial console left a lot to be desired. . .
- → Encouraged by bhyve, I decided to find a better solution for the client issue

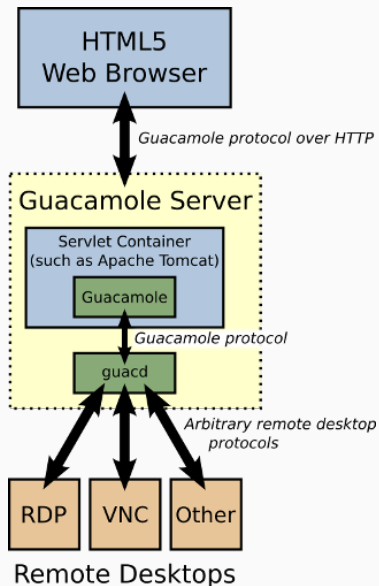
Guacamole

What is Guacamole?

- Remote desktop gateway
 - HTML5 based: no extra clients or plugins needed to use!
 - All your (virtual) machines accessible in your browser
 - Also works from tablets and smartphones via touch input
 - No changes needed on the target machines
 - Supports VNC, RDP, SSH, telnet (don't use the latter)
- Apache 2 license
- Well documented API and user manual
- Current release: 0.9.11-incubating 2017-02-02
- <http://guacamole.incubator.apache.org/>

DEMO

Guacamole Architecture



What else can Guacamole do?

- Session recording:** Recordings on video (using ffmpeg) and/or typescripts
Use cases: compliance, demonstrations
- Device redirection:** Make a server directory available for file transfers (or read-only)
- RDP Remote App:** serve only a single application to clients, close connection when program exits
- Authentication:** plain-text file (MD5 password hashes), database (MySQL/PostgreSQL), LDAP

Guacamole's Porting History in FreeBSD

2014-08-12: I added Guacamole to FreeBSD's WantedPorts wiki page¹ (for lack of a ports bit)

2015-08-29: Porting work started in PRs 202754 and 202755 by Ultima (Thanks!)

2016-06-02: Port committed by pi@

→ `net/guacamole-server`

→ `www/guacamole-client`

¹<https://wiki.freebsd.org/WantedPorts>

Future Work

- Get my first windows bhyve VM running
- Test PCI-passthrough with our NVIDIA GPUs into that VM
- Run the Guacamole server “in production” for one semester
- Find ways to optimize the server to increase user experience
- Allow more parallel connections without overloading the Guacamole server

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- Run the Guacamole server “in production” for one semester
- Find ways to optimize the server to increase user experience
- Allow more parallel connections without overloading the Guacamole server
- Profit

Special Thanks

- All bhyve developers, especially Neel Natu and Peter Grehan
- Michael Dexter for his enthusiasm and engagement for bhyve
- My student Daniel Kissel for exploring Guacamole with me
- My CS department for letting me play with expensive hardware