Desktop Virtualization with SPICE

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Agenda

- Overview
- Devices (vmchannel, QXL)
- Recent Changes
- TODO List
- Use spice: getting started
- Q+A
- Demo (?)
What is SPICE

- **Simple Protocol for Independent Computing Environments.**
- Virtual Desktop Infrastructure.
  - Network Protocol.
  - Guest Devices.
  - Guest Agent.
  - Server implementation.
  - Client application.
- Created by Qumranet.
- freedesktop.org project since January '10.
Network Protocol & Guest Devices

QEMU VM

Guest

vdagent
qxl driver
standard guest drivers

virtio‑serial
QXL (cirrus)
Keyboard Mouse Tablet
AC97 ES1370
(nic)

vmc
spice server

main
display cursor
inputs
record playback
(tunnel)

spice client

user's machine

(printer)
VM channel device

- communication path between guest and spice client.
  - Uses virtio-serial port nowadays (RHEL-6 & upstream).
  - Used to be a PCI device (RHEL-5).
  - Display information.
  - Mouse events.
  - (Cut+Paste).
QXL Device

<table>
<thead>
<tr>
<th>Bar</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>VGA framebuffer (8M)</td>
</tr>
<tr>
<td></td>
<td>commands, command data</td>
</tr>
<tr>
<td></td>
<td>cmd rings, control fields (8k)</td>
</tr>
<tr>
<td>1</td>
<td>surfaces:</td>
</tr>
<tr>
<td></td>
<td>offscreen pixmaps (textures)</td>
</tr>
<tr>
<td>2</td>
<td>qxl device info (8k)</td>
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<tr>
<td>3</td>
<td>initialization + reset</td>
</tr>
</tbody>
</table>

- Bar 0+1 are 64M by default.
- Surfaces are new in spice 0.6.
- Two device revisions
  - Rev 1 – spice 0.4
  - Rev 2 – spice 0.6 (backward compatible)
QXL Rendering

- QXL device passes commands to the spice server.
- Spice server:
  - Shared library, runs async (thread).
  - Tracks render command dependencies.
  - Sends commands to the client.
  - Can render too ("local rendering") if needed.
- Spice client:
  - Processes commands.
Migration

- VM migration.
  - save/load qxl state.
  - spice server must process all outstanding commands.
- spice client migration.
  - “switch-host”: just connect to target host.
  - “seamless”: client connects to target while VM migration is running.
    - minimize switchover latency.
Recent Changes

- Simplify build.
  - Merge pixman changes upstream.
  - Ditch dependency on patched cairo.
  - Ditch dependency on ffmpeg.
- New libspice-server API.
- Fixup data structures (next slide).
- QXL/Display: Surfaces, WAN compression.
- Network protocol optimizations.
Data structure fixups

How it used to work.

Guest: Rect

spice server: Rect

wire: Rect

spice client: Rect

How it works today.

Guest: QXLRect

qxl parser

spice server: SpiceRect

network marshaller

wire: (unnamed)

network demarshaller

spice client: SpiceRect

Sanity checks are done here

code generated with python.
TODO List

- Merge into upstream qemu.
  - plan: early in 0.14 devel cycle.
- Create libspice-client, gtk widget.
- Portability fixes.
- More cleanups.
- Tunnel & Printing.
- USB forwarding.
Using spice: getting started

- `qemu -spice port=1234,disable-ticketing -vga qxl -usbdevice tablet`
- `spicec -host localhost -p 1234`
- `fedora guest: yum install xorg-x11-drv-qxl`
- `windows guest: spice-space.org has drivers`
Using spice: with guest agent

- qemu: add “-device virtio-serial -device spicevmc”, remove usb tablet.

- fedora guest: yum install vdagent.
  - Tiny daemon feeding uinput, grew from test tool.
  - Long-term the X-Server should handle this.

- windows guest:
  - install virtio-serial driver from spice-space.org
    - Installing driver hangs winxp for me :-(
  - fetch+unpack vdagent zip, run “vdservice.exe install”.
Ressources

- www.spice-space.org
  - Wiki, docs & downloads
- cgit.freedesktop.org
  - spice git repositories.
  - also qemu with spice patches (branches spice.v$nr).
- kraxel.fedorapeople.org/spice/, F14, rawhide
  - fedora packages.
- spice-devel@lists.freedesktop.org
  - developer mailing list