FreeRDS and its X friends

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About the author

- **A linux and OSS addict since 1994.**
- **Doing security software most of my career. Now independent consultant - http://www.hardening-consulting.com/.**
- **Active FreeRDP and FreeRDS developer.**
- **The author of the « famous » wayland RDP compositor.**

Sponsors

Agenda

- **FreeRDS architecture overview**
- **Xrds**
- **Wayland FreeRDS compositor**

FreeRDS

FreeRDS > RDP protocol (1/2)

- **Quite old and 90s tainted protocol**
  - **slow/fast path**
  - **weird ROP**
  - **funny bits saving**

- **Almost all specs are « public »**

FreeRDS > RDP protocol (2/2)

- **Security used to be an option**
- **Vector operations in the past, codecs now**
- **Channels : printing, bi-directionnal sound, serial port redirection, drive sharing, remote coffee ?**

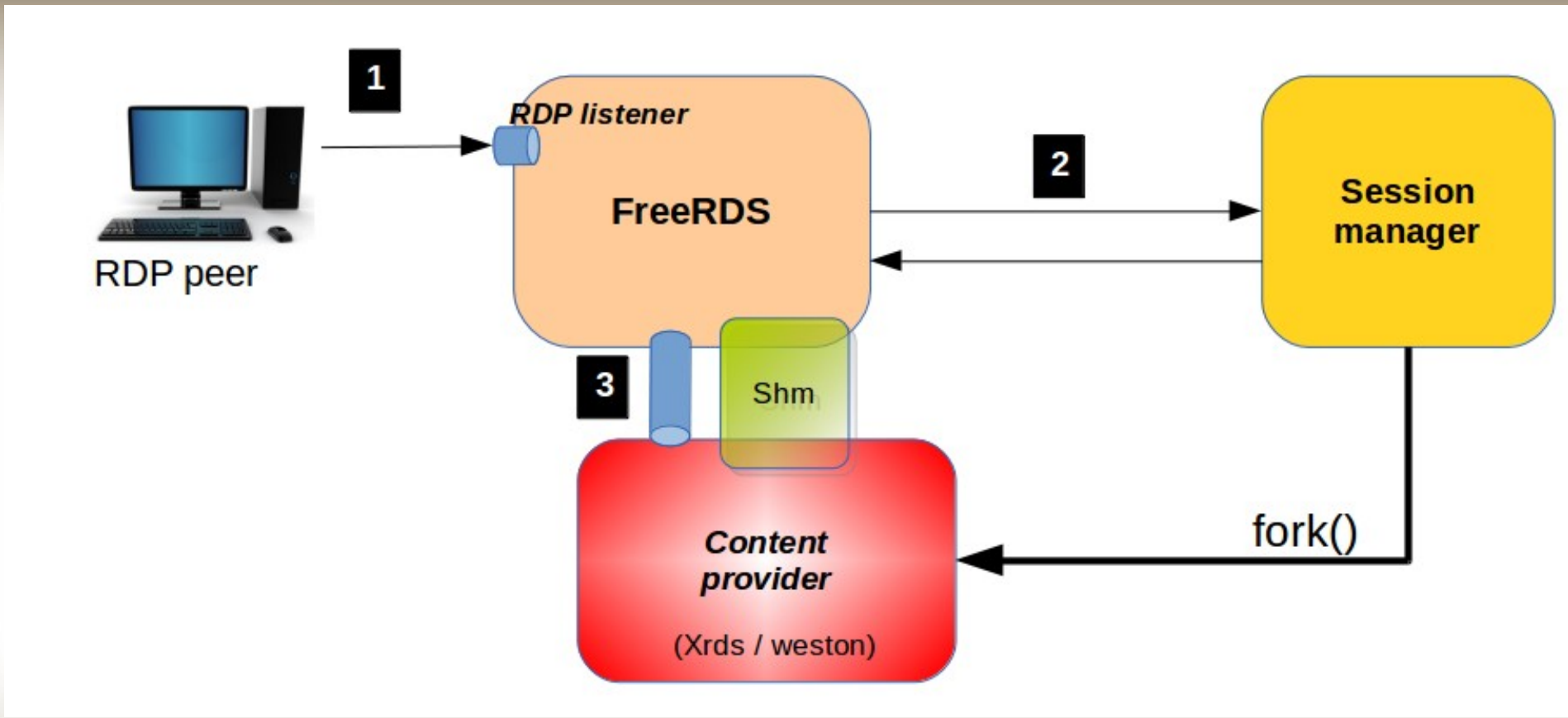
FreeRDS > the project

- **An OSS RDP server (Apache2 licence)**
- **To be (fully) published soon**
- **Inspired by Xrdp but based on FreeRDP**
- **Young (2013)**

FreeRDS > features

- **Security : RDP4, TLS, NLA**
- **Encoding : raw bitmap, planar codec, remoteFx**
- **External channel handling**
- **Session reconnection**
- **Session shadowing**

FreeRDS > entities

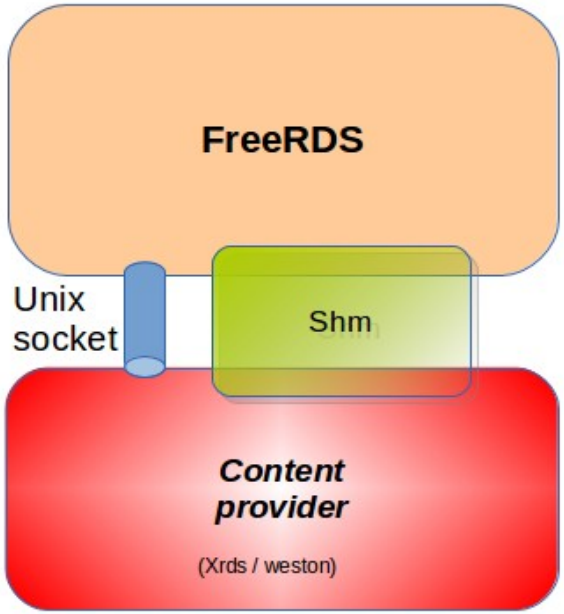


FreeRDS > in pratice

- **Written in C (FreeRDS) and C++ (sessionManager), CMake**
- **Based on FreeRDP**
- **Linux for now but targets multi-platform**
- **Protobuf, thrift and D-Bus**
- **A library to help building content providers**

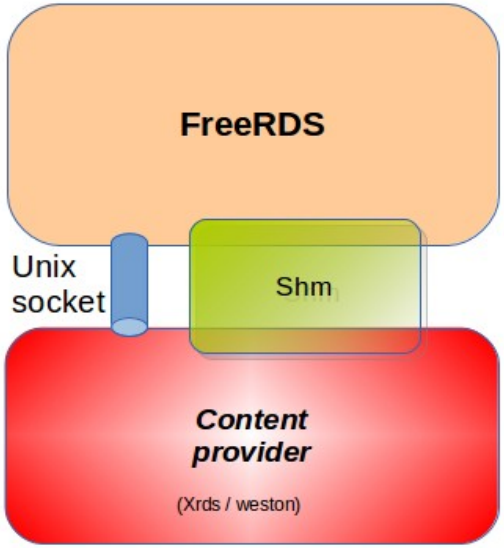
FreeRDS > under the hood (1/3)

- **Unix socket as a control channel**
  - **Signaling messages**
  - **Mouse moves**
  - **Key presses**
- **Shared memory**
  - **Framebuffer**
  - **Damaged regions**

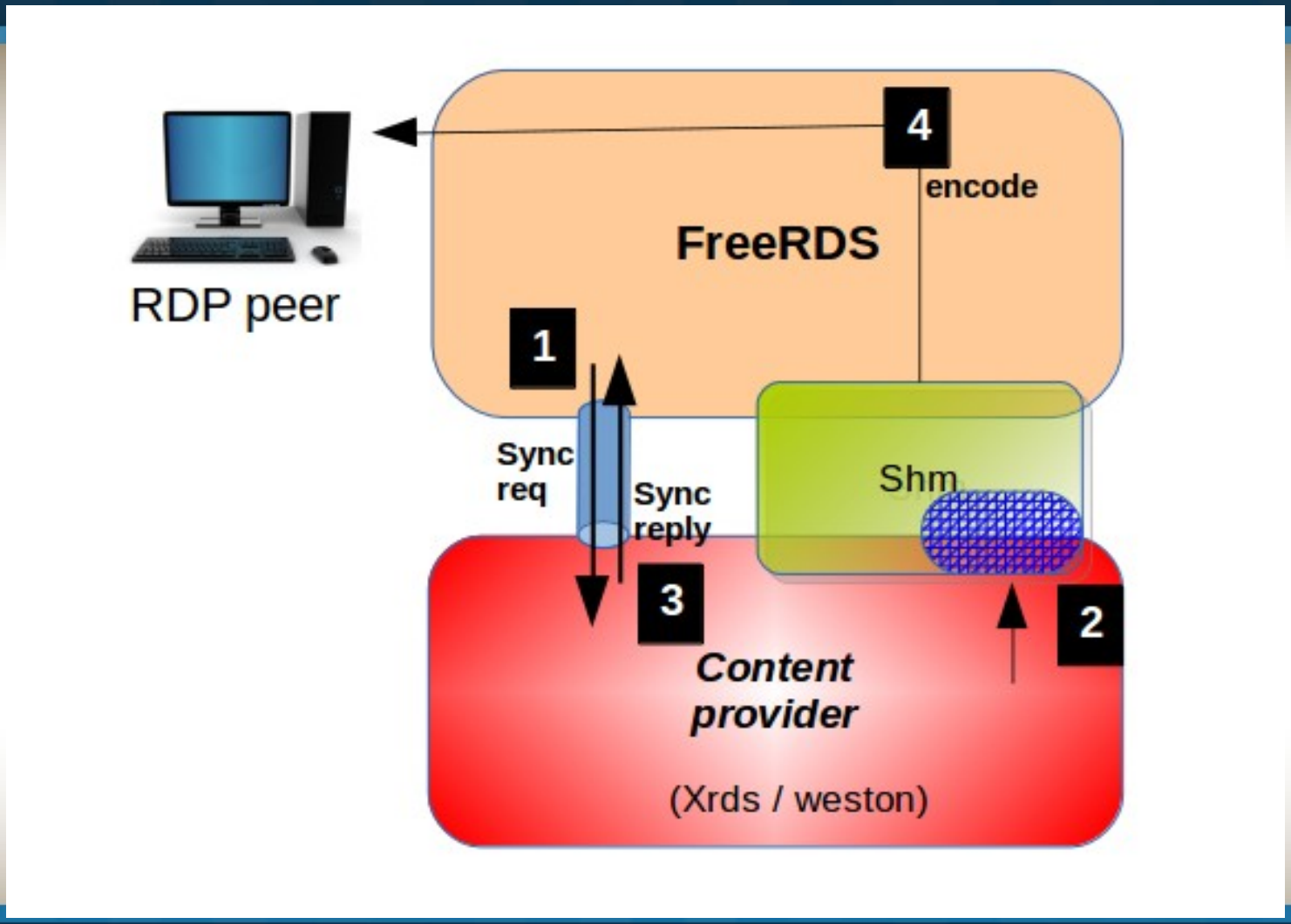


FreeRDS > under the hood (2/3)

- At connection, FreeRDS sends
  - Version
  - Screen depth / size
  - Keyboard layout
- Content provider answers
  - Byte / bits per pixel
  - Scanline
  - Size



FreeRDS > under the hood (3/3)



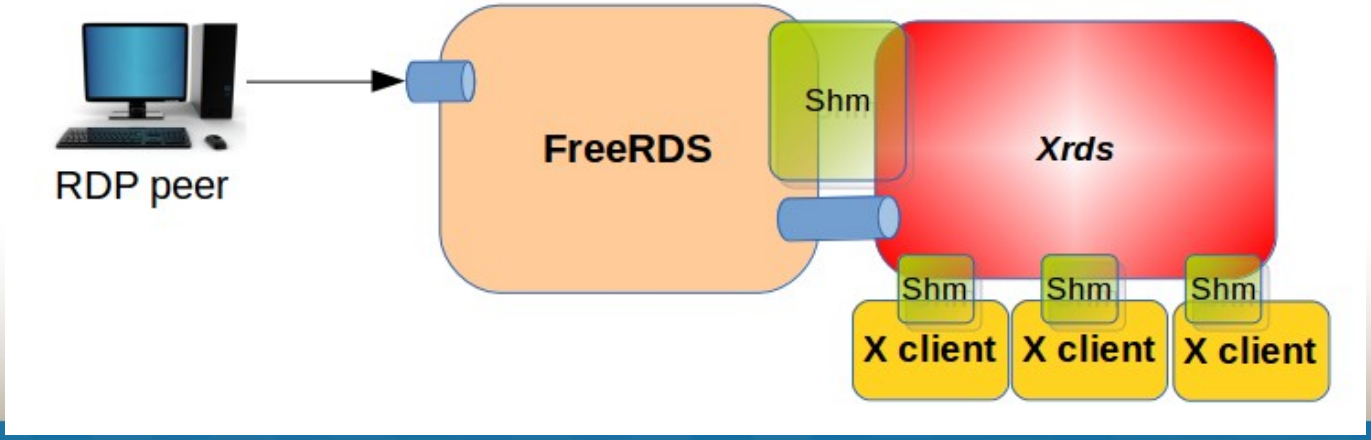
FreeRDS > key points

- **FreeRDS does RDP**
- **Content provider creates the visible content**

Xrds

Xrds > about

- **X11 content provider**
- **A headless X server like x11vnc**
- **FreeRDS DDX, (currently) based on Xorg 1.15**
- **Links against the content provider helper library**



Xrds > features

- **One mouse (client side pointer)**
- **One keyboard : a xkb layout for the remote RDP keyboard layout**
- **Functional xrandr**
- **External program (channel) for clipboard**
- **Supports reconnection**

So…

I love it when a plan comes together

Xrds > xrandr m'a tuer...

- **Fake modelines, timing, EDID block**
- **Use the right unit**
- **Race conditions**
- **Shut up the Desktop Environment**

Xrds > crazy pointer update

- **Problem : application updating pointers at a mad rate**
- **Solution : check pointer changed (pointer cache)**

Xrds > damage is not damaged

- **Problem : old flash player constantly updates the whole screen when the video is paused**
- **Solution : frame comparison**
  - **Split damage in 32x32 tiles**
  - **Compute the real damage**
- **Nice gains even with a fullscreen video**

Xrds > key points

- **Full X11 environment under FreeRDS**
- **Gains for other content providers**

FreeRDS compositor

FreeRDS compositor > about

- **A FreeRDS backend for weston**
- **An advanced prototype**
- **Your remote desktop running weston**

FreeRDS compositor > features

- **Uses the pixman renderer**
- **1 seat (except with shadowing)**
- **Maps the RDP layout to a XKB layout**

FreeRDS compositor > key points

- **Works**
- **Give it a try !**

Next...

Future work

- **Add support for extended RDP input to weston / Xrds (multitouch)**
- **RDP clipboard in weston**
- **Graphics with the egfx channel**

Questions ?

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Sponsors: office@thincast.com

FreeRDP: http://github.com/FreeRDP/FreeRDP

FreeRDS: http://github.com/FreeRDS/FreeRDS

Weston backend: http://github.com/hardening/weston

Extra slides

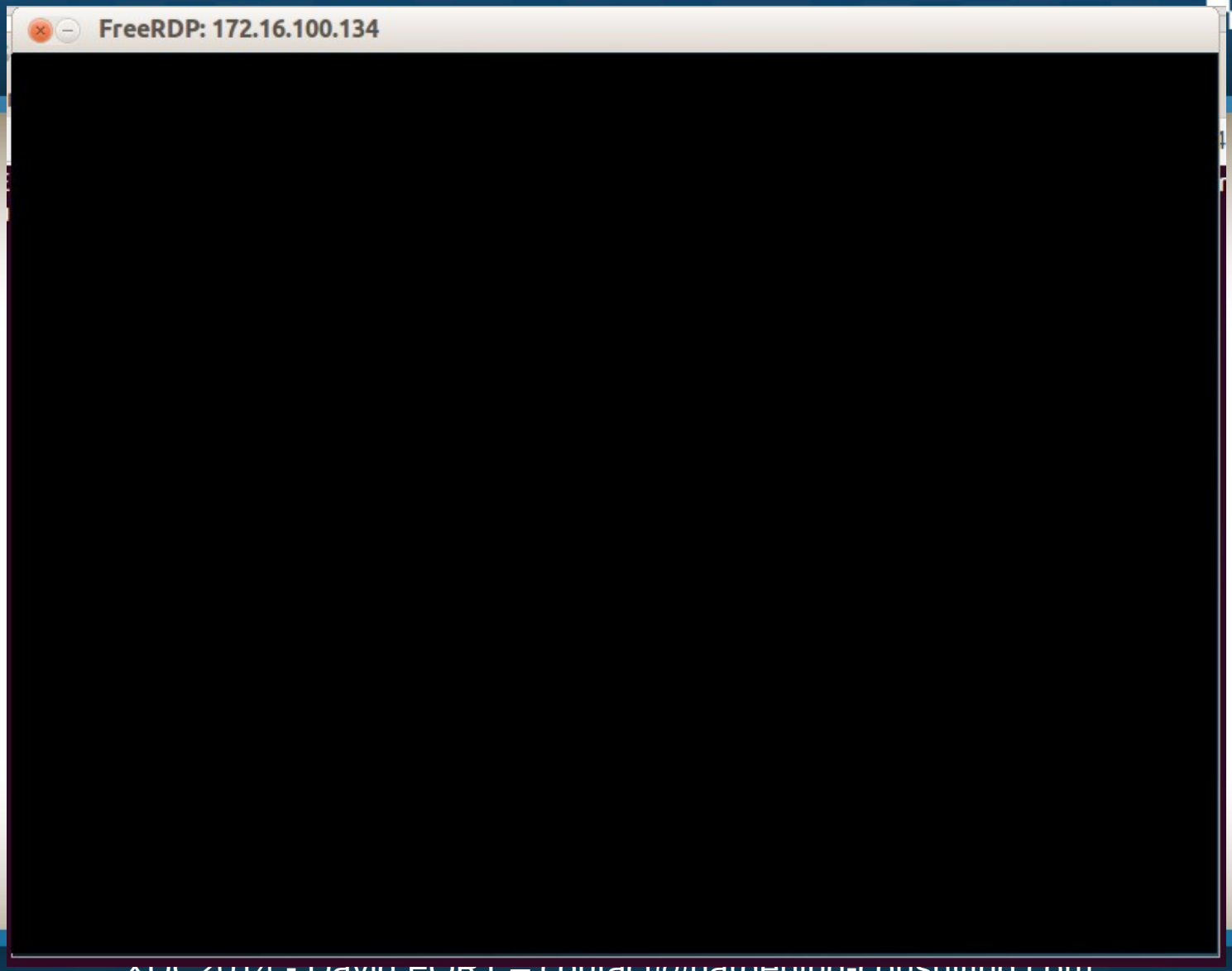
Steps for an RDP server – should compile ...

```
$ ./rdp-server
bash: ./rdp-server: No such file or directory
$
```

Steps for an RDP server – listener not listening

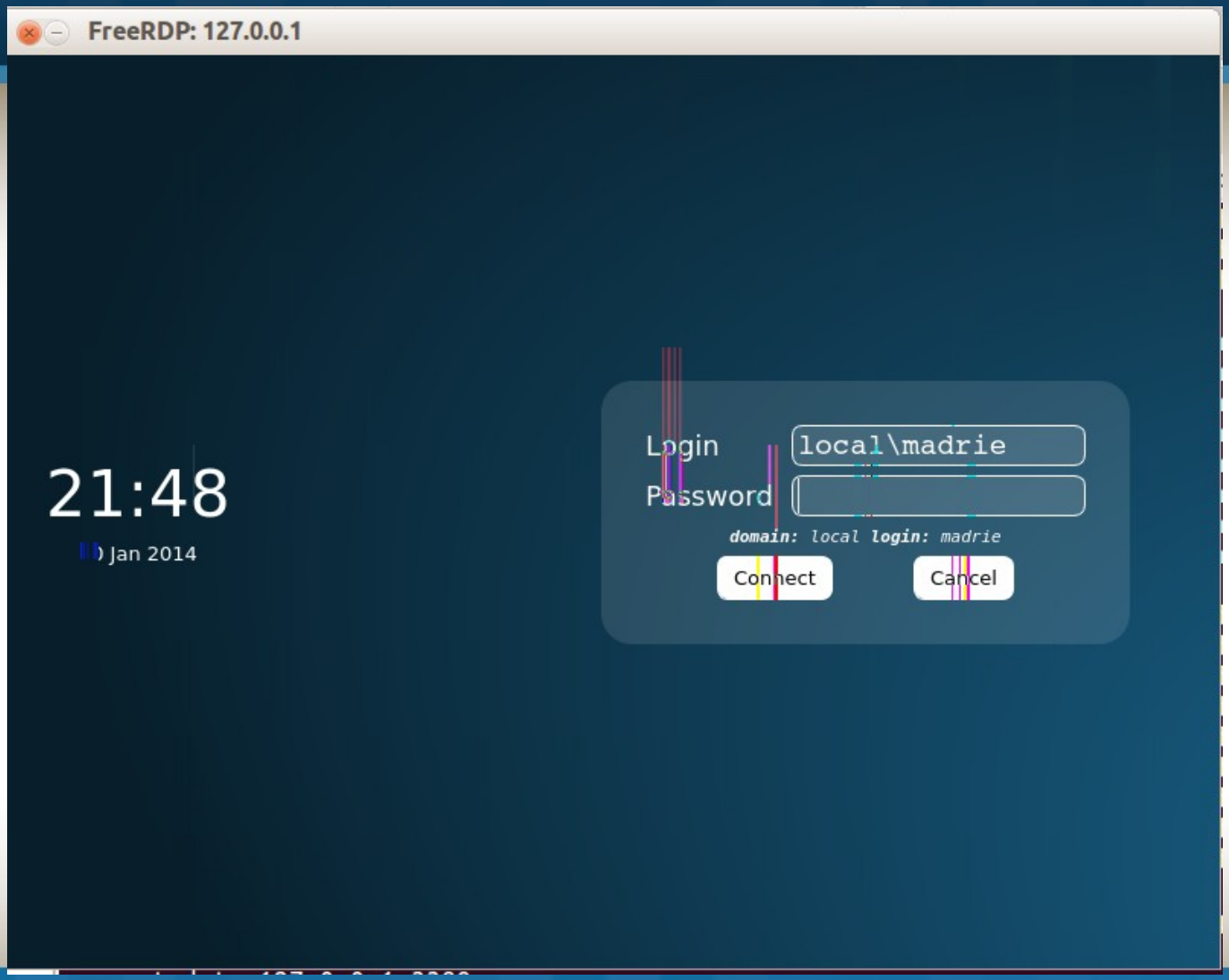
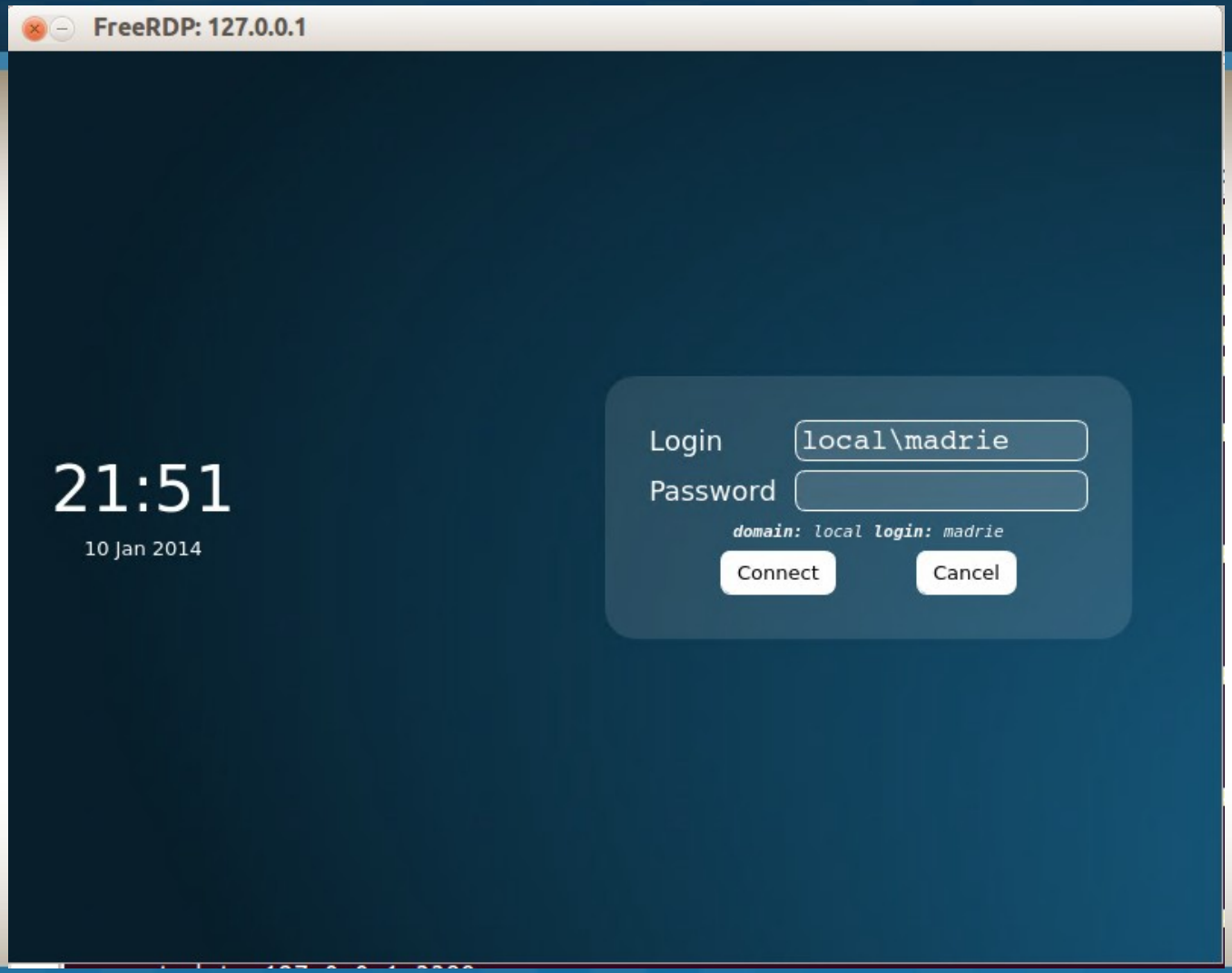
```
$ xfreerdp /v:<my host>
freerdp_set_last_error 0x2000C
Error: protocol security negotiation or connection failure
$
```

Steps for an RDP server – black screen



Steps for an RDP server – fireworks

Steps for an RDP server – artifacts



Steps for an RDP server – go for a beer