Libvirt

What did we do wrong?

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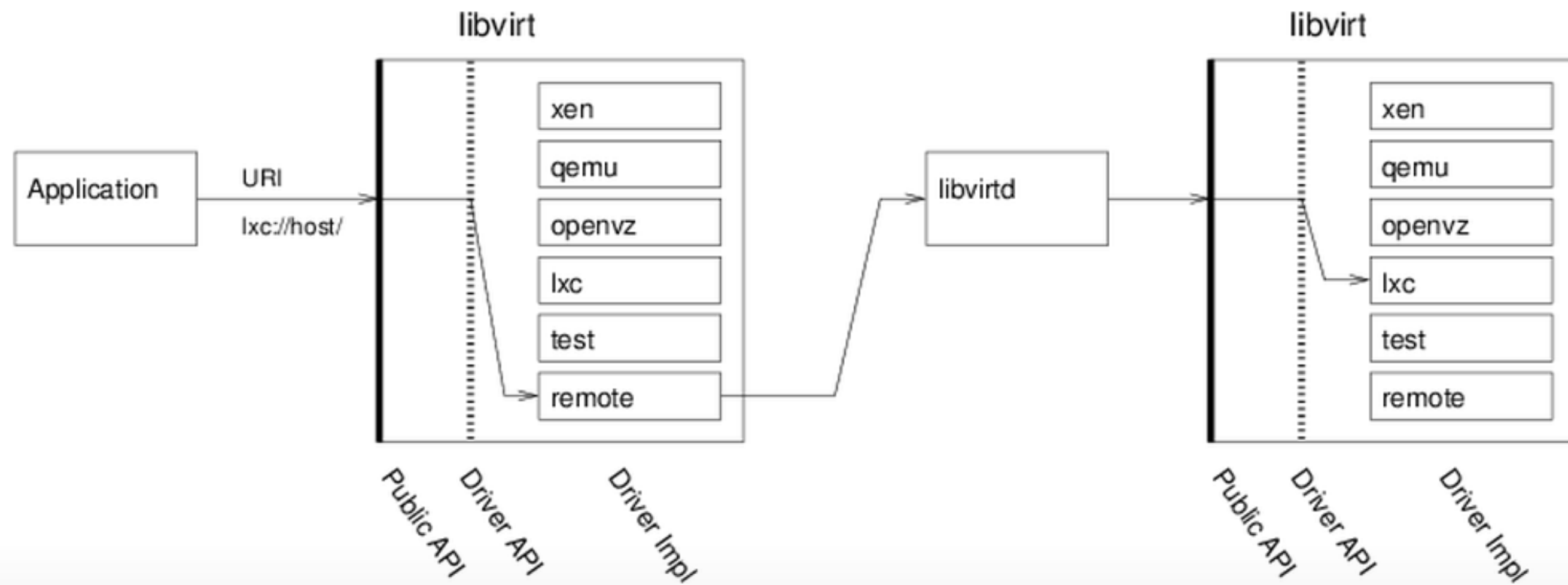
What is Libvirt?

- C library, bindings

- Stable API

- Multiple hypervisors

- Host management

What is Libvirt?

Libvirt internals

What did we do wrong?

APIs missing some arguments

- `virDomainShutdown(virDomainPtr domain)`
- `virDomainShutdownFlags(virDomainPtr domain, unsigned int flags)`

What did we do wrong?

APIs missing some arguments

- `virDomainCoreDump(virDomainPtr dom, const char *to, unsigned int flags)`

- `virDomainCoreDumpWithFormat(virDomainPtr dom, const char *to, unsigned int fmt, unsigned int flags)`

What did we do wrong?

APIs too tied to a specific hypervisor

- `virDomainCreate(virDomainPtr dom)`

- `virDomainCreateWithFlags(`
  `virDomainPtr dom, unsigned int flags)`

- `virDomainCreateWithFiles(`
  `virDomainPtr dom, unsigned int nfiles, int`
  `*files, unsigned int flags)`

What did we do wrong?

APIs inherently racy

```c
int numActive, *idList, i;

numActive = virConnectNumOfDomains(conn);
idList = malloc(sizeof(int) * numActive);
virConnectListDomains(conn, idList, numActive);

for (i = 0; i < numActive; i++) {
  virDomainPtr dom = virDomainLookupByID(conn, idList[i]);
  /* Do something useful with @dom. */
}
```

What did we do wrong?

From bare C and glibc:

```c
free(NULL);
```

Not in libvirt:

```c
virDomainFree(NULL); /* Causes an error */
virDomainInterfaceFree(NULL); /* No error */
```

What did we do wrong?

Bad naming

- `virDomainDestroy()`

- ```
  <controller type='pci' model='pcie-root-
  port'>
    <model name='ioh3420'/>
  </controller>
  ```

What did we do wrong?

XML elements

- \<xml/\>

What did we do wrong?

Internal code

- Introducing a new feature sometimes means rewriting a significant portion of directly not related code

What did we do right?

Internal APIs

- Majority of our API is internal
- For instance, many requests for turning virCommand into a separate library

What did we do right?

Internal objects

- Objects are not exposed to user
- Public header file:
  typedef struct _virDomain virDomain;
- Private file: struct _virDomain { ... };

virConnect object has been adjusted more than 20 times.

Analysis

APIs missing some arguments

- Historical reasons
    - Libvirt started as a Xen wrapper
- Changing requirements
    - Hard to do proper analysis and design

Analysis

APIs too tied to a specific hypervisor

- Many one-man-show drivers
    - Lacking knowledge of approaches though all HVs
- Downstream deadlines
    - APIs pushed without driver implementation

Analysis

Traditional software vs Open source

- Hard to follow traditional SE models (e.g.waterfall model)
- OSS is able to go back and forth in SE models

- Perhaps some agile methodologies
- Daily SCRUM over IRC?

Analysis

Traditional software vs Open source

eXtreme Programming has some answers:

- Refactor
- Write tests (both unit and integration)
- Release often

Resolution

Traditional software vs Open source

- We did some mistakes, but we've learned from them

- Use common sense

- Be nice to new contributors

<Thank You!>

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