A Quick Tour of the QEMU Monitor Protocol

Red Hat
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Outline

Section 1

Brief Introduction

The QEMU Monitor Protocol (QMP)

- A protocol for applications to talk with QEMU
- Features:
  - Lightweight, text-based, easy to parse syntax (JSON)
  - Asynchronous messages support (ie. events)
  - Capabilities Negotiation
- Main developers: Luiz Capitulino and Markus Armbruster (with help from others, of course)

Status

- Merged in 0.13
- Functional (has issues, though)
- Almost forty commands and eleven events
- Libvirt and kvm-autotest support it
- The current interface is NOT stable yet

Section 2

Key Design Decisions

The data format: JSON

- JavaScript Object Notation (RFC 4627)
- Language-independent, lightweight, easy to read, easy to parse
- Data types:
  - Primitives: strings, numbers, booleans, and null
  - Structured:
    - arrays: ["love", 10, true, null]
    - objects: { "french": "C'est la vie" }

QMP example: ejecting a medium (success)

```
-> {
        "execute": "eject",
        "arguments": {
            "device": "ide1-cd0"
        }
    }

<- {
        "return": {}
   }
```

QMP example: ejecting a medium (failure)

```
-> {
        "execute": "eject",
        "arguments": {
            "device": "foobar"
        }
    }

<- {
        "error": {
            "class": "DeviceNotFound",
            "desc":  "Device 'foobar' not found",
            "data": {
                "device": "foobar"
            }
        }
    }
```

QMP example: asynchronous message

```
<- {
        "event": "BLOCK_IO_ERROR",
        "data": {
            "device": "ide0-hd1",
            "operation": "write",
            "action": "stop"
        },
        "timestamp": {
            "seconds": 1265044230,
            "microseconds": 450486
        }
    }
```

The old monitor

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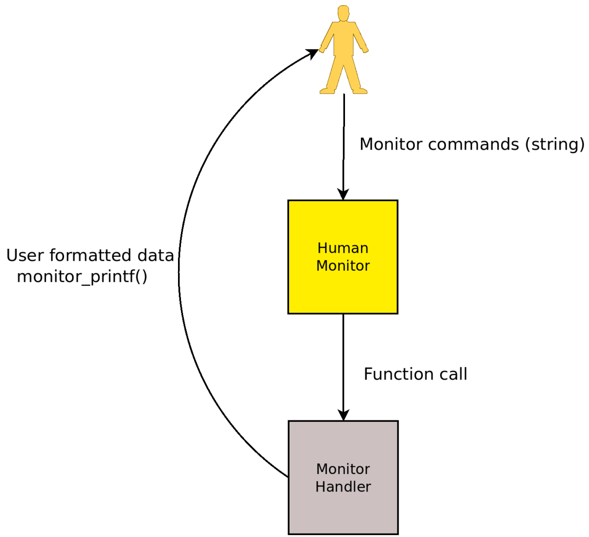
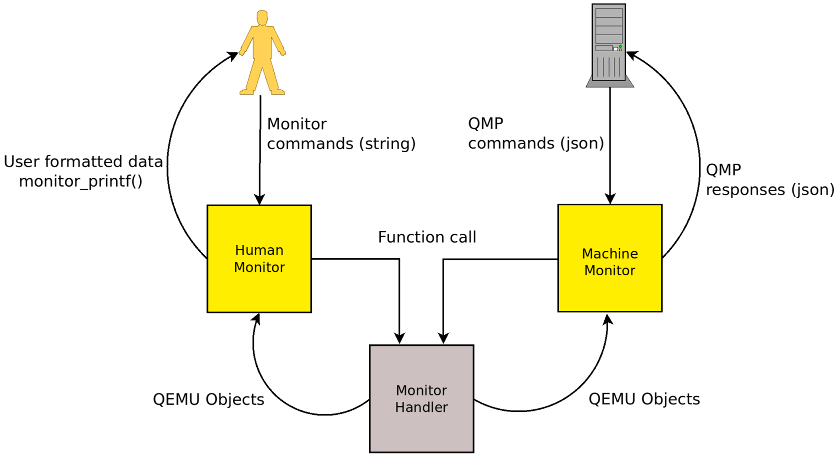


The new monitor: introducing objects



Error reporting

```
1. qerror_report() call

qerror_report(QERR_DEVICE_INIT_FAILED, "e1000");

2. Error macro

#define QERR_DEVICE_INIT_FAILED \
"{ 'class': 'DeviceInitFailed', 'data': { 'device': %s } }'

3. Error table entry

{
 .error_fmt = QERR_DEVICE_INIT_FAILED,
 .desc      = "Device '%(device)' could not be initialized",
}
```

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Section 3
Issues and Challenges

Main issues

- Bad stuff from the human monitor leaked into QMP
- Existing code dictated the interface
- Code is ugly and needs cleanup
- Tried to do way too much at once
- Error reporting and asynchronous handlers

Error reporting: summary

- Zillions of errors
- One error message per error
- The error object is global in the monitor
- The appropriate solution is still open to debate

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Asynchronous commands

- Some commands are slow or depend on the guest response (eg. migrate, savevm, device_del, balloon, etc)
- Possible solution: just delay the response object
- Two possible protocol changes:
  - Mark specific asynchronous handlers as so
  - Add a new keyword, eg. "execute_async", and commands must obey both "execute" **and** "execute_async"
- Error reporting has to be fixed first

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Challenges

- Define a realistic set of goals
- Improved development process
- Specification review
- We need to ship something useful and stable in 0.14

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Thanks for listening!

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http://www.linux-kvm.org/page/MonitorProtocol