oVirt

oVirt Extension API

The first step for fully modular oVirt

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Agenda

- Introduction
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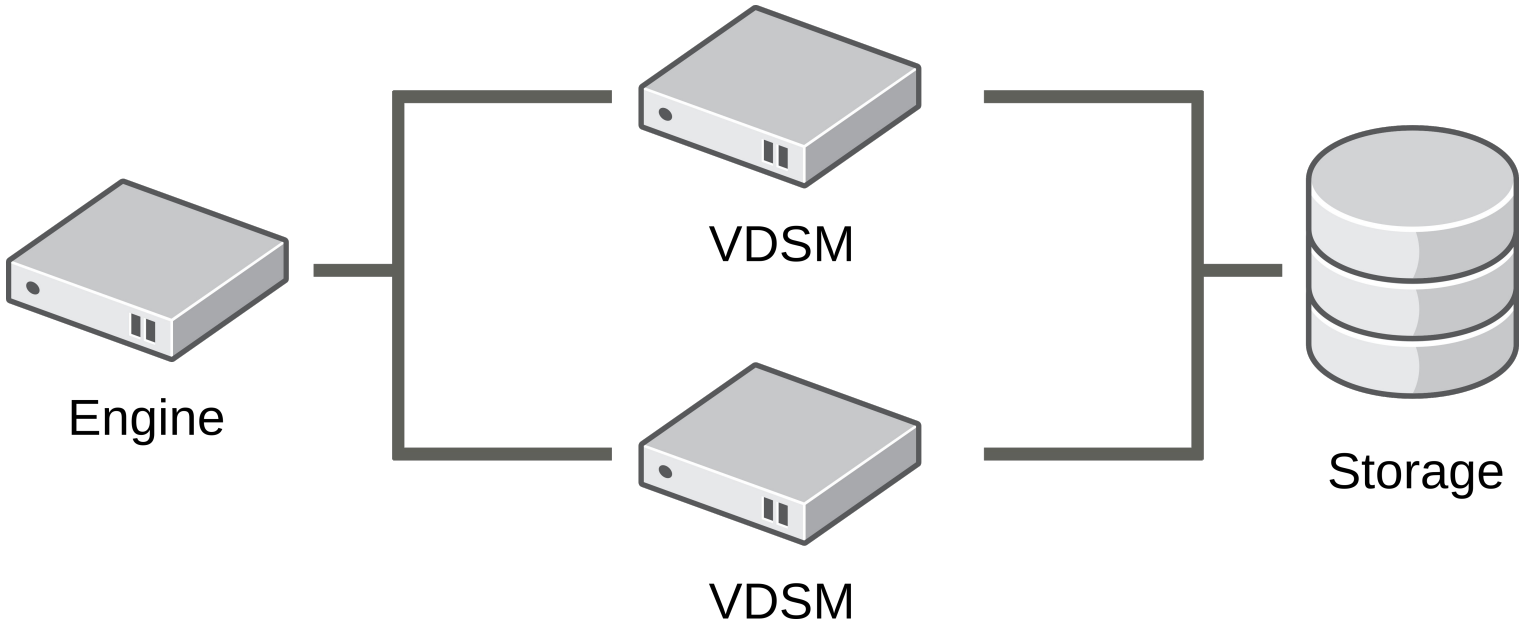
- Extension API for AAA
- Extension API for Logging
- Extension API Tools
- Future plans

Introduction

What is oVirt?

- Large scale, centralized management system for server and desktop virtualization based on Linux/KVM



Extending oVirt prior to version 3.5

- Extensibility of oVirt < 3.4 was limited, the project consisted of two monolitic parts: Engine and VDSM
- **Engine UI Plugins**
  - enables to create a plugin for UI that is able to communicate with Engine using REST API
- **VDSM Hooks**
  - enable to execute custom script/command at certain predefined points in the flow

What is AAA?

- **Authentication**
  - Verification of identity that is trying to access the system
- **Authorization**
  - Verification of resources that identity is allowed to access
- **Accounting**
  - Statistics of resource usage by identity

AAA status in oVirt <= 3.4

- Complex implementation using Kerberos
- Insecure (no SSL/TLS, no SSO)
- No proper support for multi-domain setup
- No customization (monolithic module, logic and schema hard-coded)
- Not optimized (always recursive, sub-optimal LDAP queries)

Monolithic or extension based?

- Monolithic methodology is never flexible enough for customization not considered during initial design
- “Easy” to extend without breaking backward compatibility
- Not specific to AAA, but usable for whole oVirt Engine
- Possibility to write extensions in other languages (provided by JVM)
- Ability for extension to extension interaction

oVirt Engine Extension API

Engine Extension API

- Introduced in oVirt 3.5
- Currently used only for AAA and logging, but available for all parts of engine
- JBoss Modules is used to load extensions
- Extension's configuration is stored in properties files

Engine Extension API

- Primitive invoke-based interface, parameters are passed as maps

```
package org.ovirt.engine.api.extensions;

public interface Extension {
    void invoke(ExtMap input, ExtMap output);
}
```

Engine Extension API

- Map keys contains meaningful name, UUID and type:

```
public static final ExtKey COMMAND = new ExtKey(
        "EXTENSION_INVOKE_COMMAND",
        ExtUUID.class,
        "485778ab-bede-4f1a-b823-77b262a2f28d"
);

public static final ExtKey RESULT = new ExtKey(
        "EXTENSION_INVOKE_RESULT",
        Integer.class,
        "0909d91d-8bde-40fb-b6c0-099c772ddd4e"
);
```

Engine Extension API

- Common types for all extensions are placed in org.ovirt.engine.api.extensions package:
- **ExtUUID**
  - contains UUID and descriptive name
- **ExtKey**
  - consists of ExtUUID and type
- **ExtMap**
  - defined as Map<ExtKey, Object>
  - contains run-time type enforcement to value with key type information

Engine Extension API

- **Base**
  - contains common constants for all extensions:
  - **InvokeKeys**
    - keys of input/output maps for invoke() method
  - **InvokeCommands**
    - available commands:
      LOAD, INITIALIZE, TERMINATE
  - **InvokeResult**
    - result of invoke() method execution:
      SUCCESS, UNSUPPORTED, FAILED

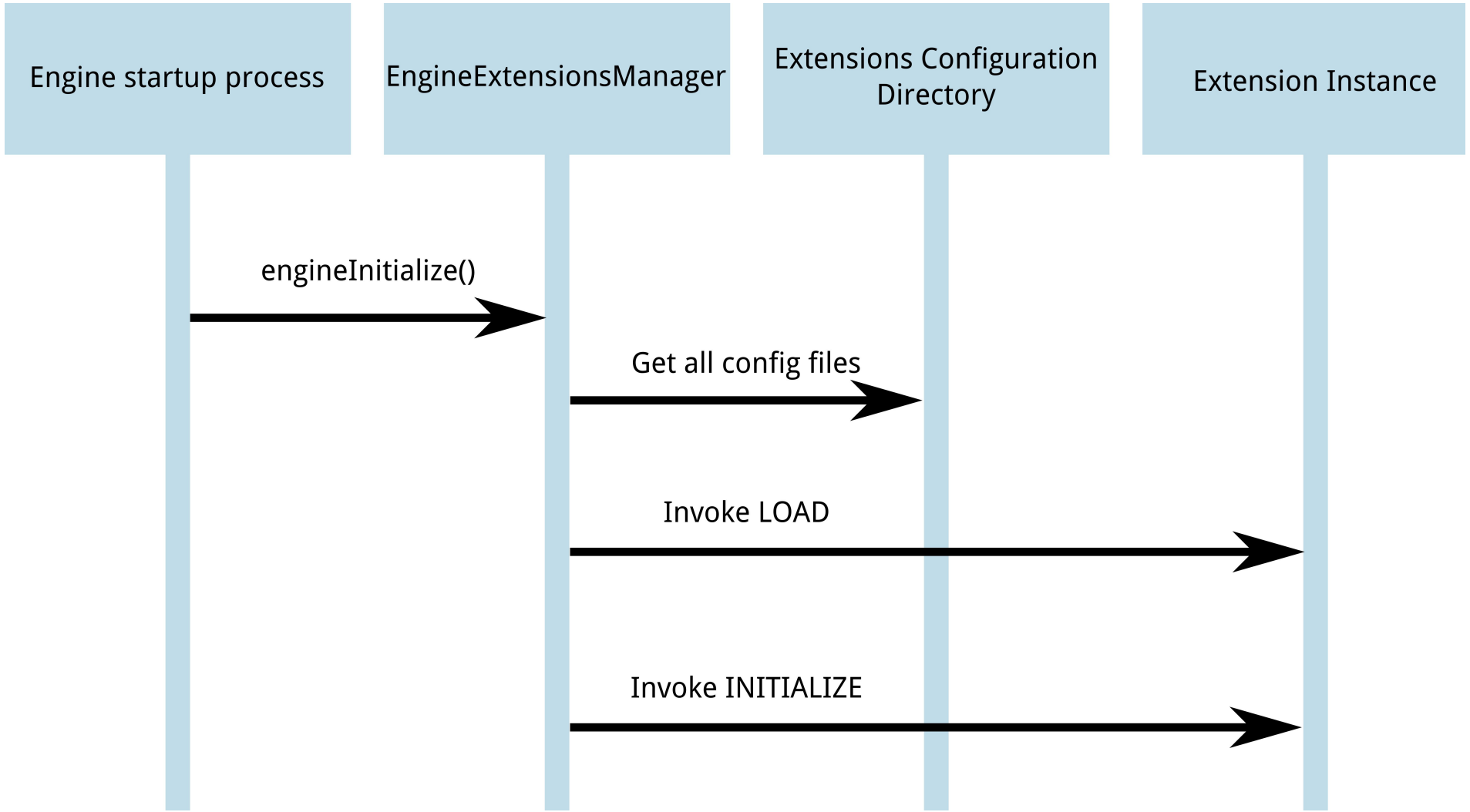
Engine Extension Configuration

- Extension configuration is stored in a property file which has to contain some mandatory options and may contain other extension specific options
- Configuration files should be placed under one of those directories:
  - `/etc/ovirt-engine/extensions.d`
  - `/usr/share/ovirt-engine/extensions.d`
- Configured extensions are loaded during engine start-up

Extension Configuration Sample

```
ovirt.engine.extension.name = myextension

ovirt.engine.extension.bindings.method = jbossmodule

ovirt.engine.extension.binding.jbossmodule.module =
    org.ovirt.engineextensions.myext

ovirt.engine.extension.binding.jbossmodule.class =
    org.ovirt.engineextensions.myext.MyExtension

ovirt.engine.extension.provides =
    org.ovirt.engine.api.extensions.Extension
```

Extension Start-up Flow



ExtensionsManager class

- Provides internal API for engine to access extensions
- Uses Observer pattern to notify about extension updates
- It provides methods to access extensions:

List<ExtensionProxy> **getExtensionsByService**(
String provides)

ExtensionProxy **getExtensionByName**(String name)

List<ExtensionProxy> **getLoadedExtensions**()

List<ExtensionProxy> **getExtensions**()

ExtensionProxy class

- Each loaded extensions is decorated with **ExtensionProxy** instance

- **ExtensionProxy** simplifies invoke() method execution:
  - Returns output map
  - Catches exceptions in case of a failure
  - Makes problem determination easier

Engine Extension API for Logging

Logger

- Constants related to logger extensions are stored in **org.ovirt.engine.api.extensions.logger.Logger**

- Provides ability to:
  - Publish log record to logger extension
  - Flush log records in logger extension
  - Close logger extension

Logger extensions

- **logger-log4j**
  - Provided by ovirt-engine-extension-logger-log4j package
  - Provides log4j appenders for oVirt Engine
  - Can be used for example to pass oVirt Engine log records to syslog

Code sample

Engine Extension API for AAA

AAA – Authentication (aka authn)

- Constants related to authentication extensions are stored in **org.ovirt.engine.api.extensions.aaa.Authn**
- Goal:
  - Verify the user that tries to access system
- Input:
  - User name and password or
  - HTTP negotiation
- Output:
  - Authentication record which contains principal and validity time interval

AAA – Authorization (aka authz)

- Constants related to authorization extensions are stored in **org.ovirt.engine.api.extensions.aaa.Authz**
- Goal:
  - Provide details about user
- Input:
  - Principal
- Output:
  - Authentication record with additional information (user details, set of groups, etc.)

AAA – Accounting (aka acct)

- Constants related to accounting extensions are stored in **org.ovirt.engine.api.extensions.aaa.Acct**
- Provides framework for security related events (successful/unsuccessful login, logout, etc.)
- It will provide full auditing capability in future

AAA – Mapping

- Constants related to mapping extensions are stored in **org.ovirt.engine.api.extensions.aaa.Mapping**
- Provides:
  - mapping of user name before authn
  - mapping of principal before authz
- Examples:
  - removing Kerberos suffix from user name before SSO
  - removing domain name from principal before accessing LDAP

AAA – Filters

- Set of servlet filters to handle authentication:
  - Supports negotiation using authz extensions.
  - Supports basic authentication.
  - HTTP session management.

Existing AAA extensions

- **internal**
  - Built-in into Engine
  - Provides only admin user to login to oVirt
  - Mostly used only in development environment, in production oVirt 3.6+ it's replaced with **aaa-jdbc**
- **kerberosldap**
  - Built-in into Engine
  - The legacy mixed kerberos/ldap implementation
  - It's deprecated in 3.6 (may be removed in 4.0) and should be replaced with **aaa-ldap**

Existing AAA extensions

- **aaa-ldap**
  - Provided by **ovirt-engine-extension-aaa-ldap** package
  - Interface for users/groups stored in LDAP server
  - Supports most of LDAP servers
  - Can be fully customized using configuration files
- **aaa-misc**
  - Provided by **ovirt-engine-extension-aaa-misc** package
  - Contains miscelaneous utilities for AAA
  - Can be use to configure kerberos support for oVirt using Apache mod_auth_kerb

Existing AAA extensions

- **aaa-jdbc**
  - New in oVirt 3.6
  - Provided by **ovirt-engine-extension-aaa-jdbc** package
  - Interface for users/groups stored in PostgreSQL database
  - Provides command line tool **ovirt-aaa-jdbc-tool** to manage users/groups
  - Replaces **internal** extension in production environment

Engine Extension API Tools

Engine Extension API Tools

- **ovirt-engine-extensions-tool**
  - New in oVirt 3.6
  - Provides ability to show information about installed extensions (list, show configuration, ...)
  - Enables testing of the extension functionality without running engine

Future plans

AAA – Future plans

- **ovirt-engine-extension-aaa-sssd**
  - sssd support.
- **SSO service for oVirt applications**
  - Move Authn to its own application, modify userportal, webadmin, reports to trust AAA application.
- We are currently planning what other parts of engine will expose its features via Extension API in oVirt 4.0

THANK YOU!

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