A New CloudStack Driver Model

Rohit Yadav
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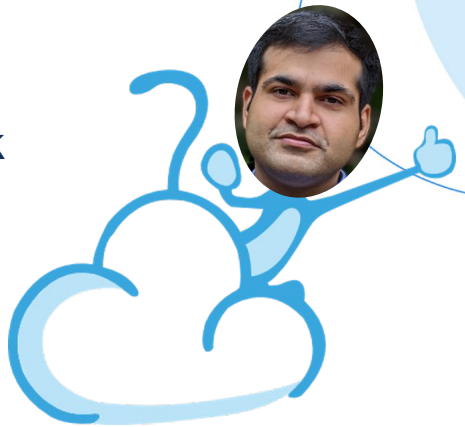
Who is Rohit?

- PMC Member, Committer & ex-VP, Apache CloudStack
- VP Engineering, ShapeBlue
- Mentor & Leader | Author of several flagship CloudStack features, frameworks and tools
- Release Manager of several past releases
- Homelabber, Tinkerer, Cat Servant

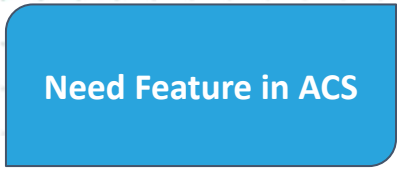


Why This Talk?

Overview Current CloudStack Dev Workflow

Overview

Current CloudStack Dev Workflow



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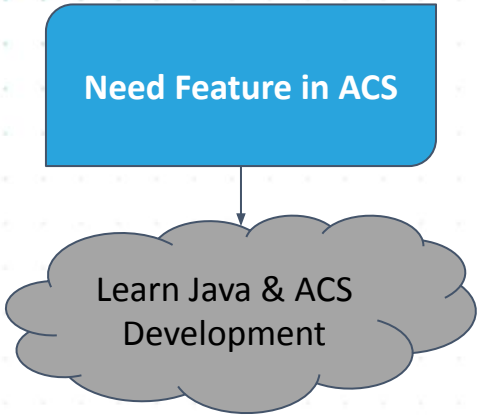

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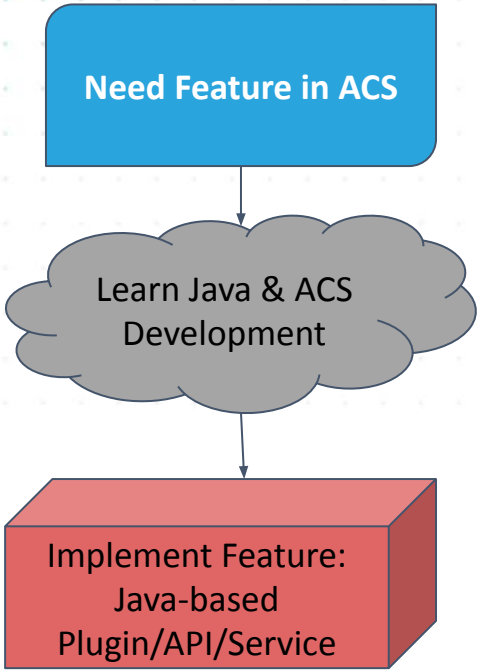

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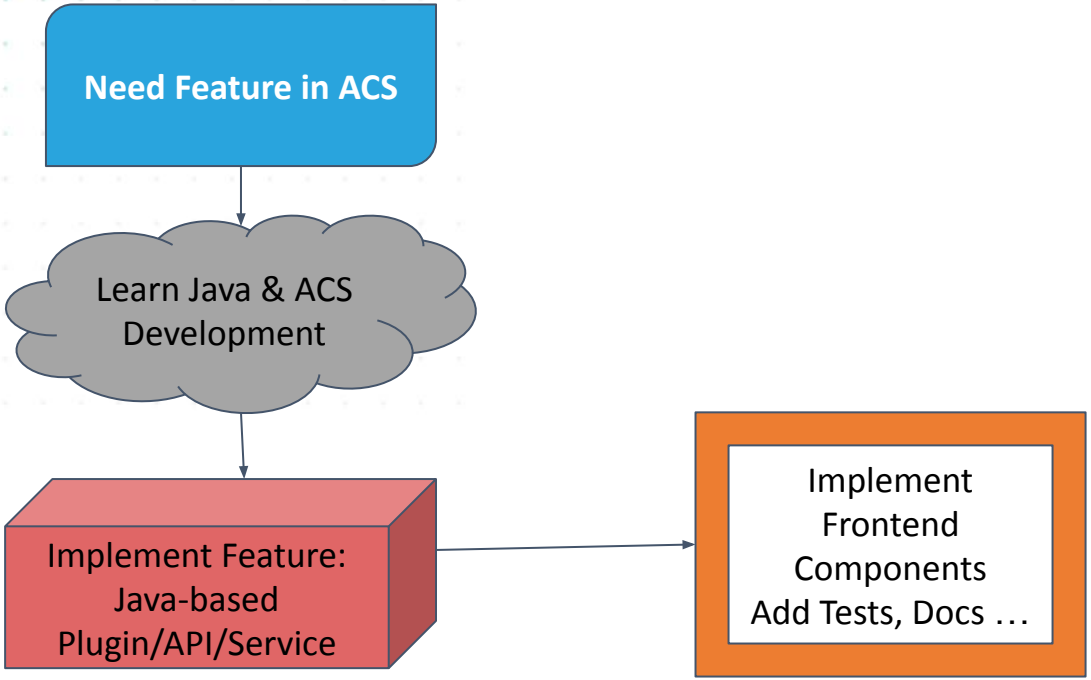

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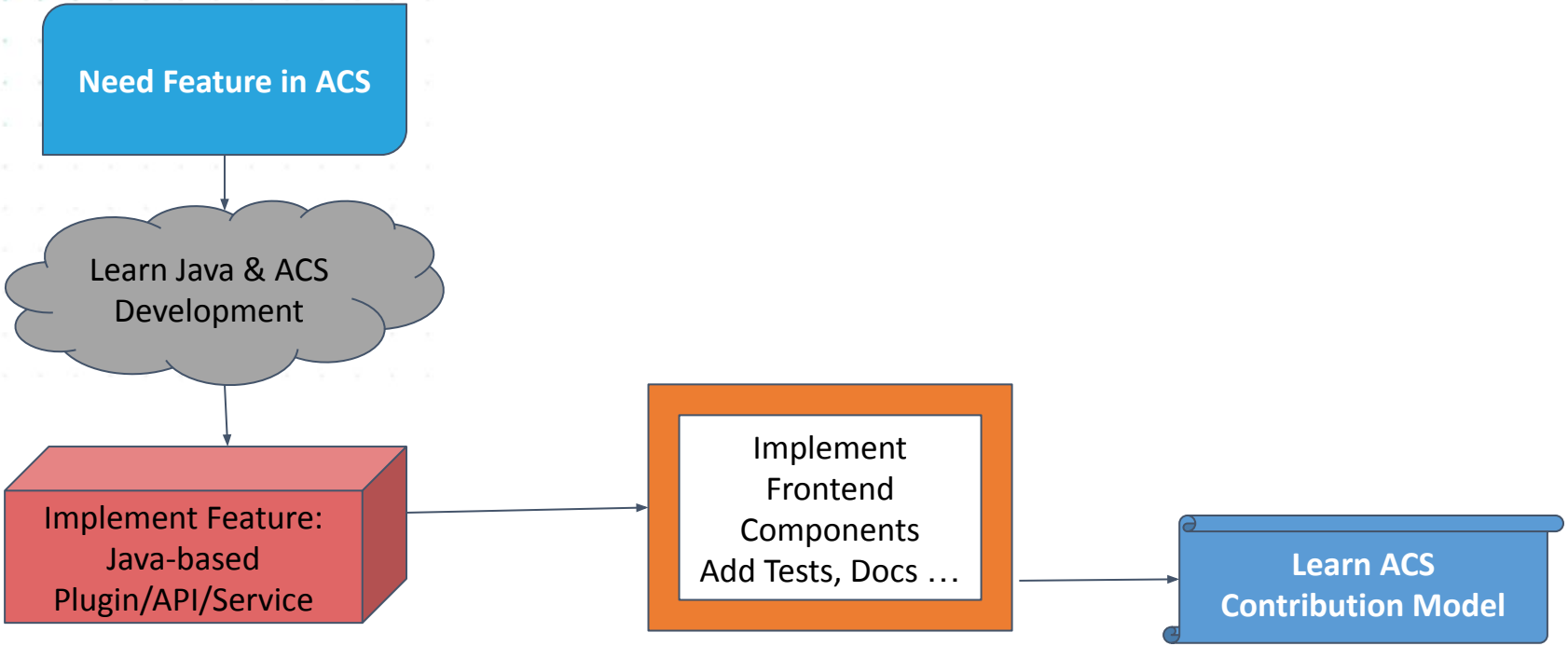

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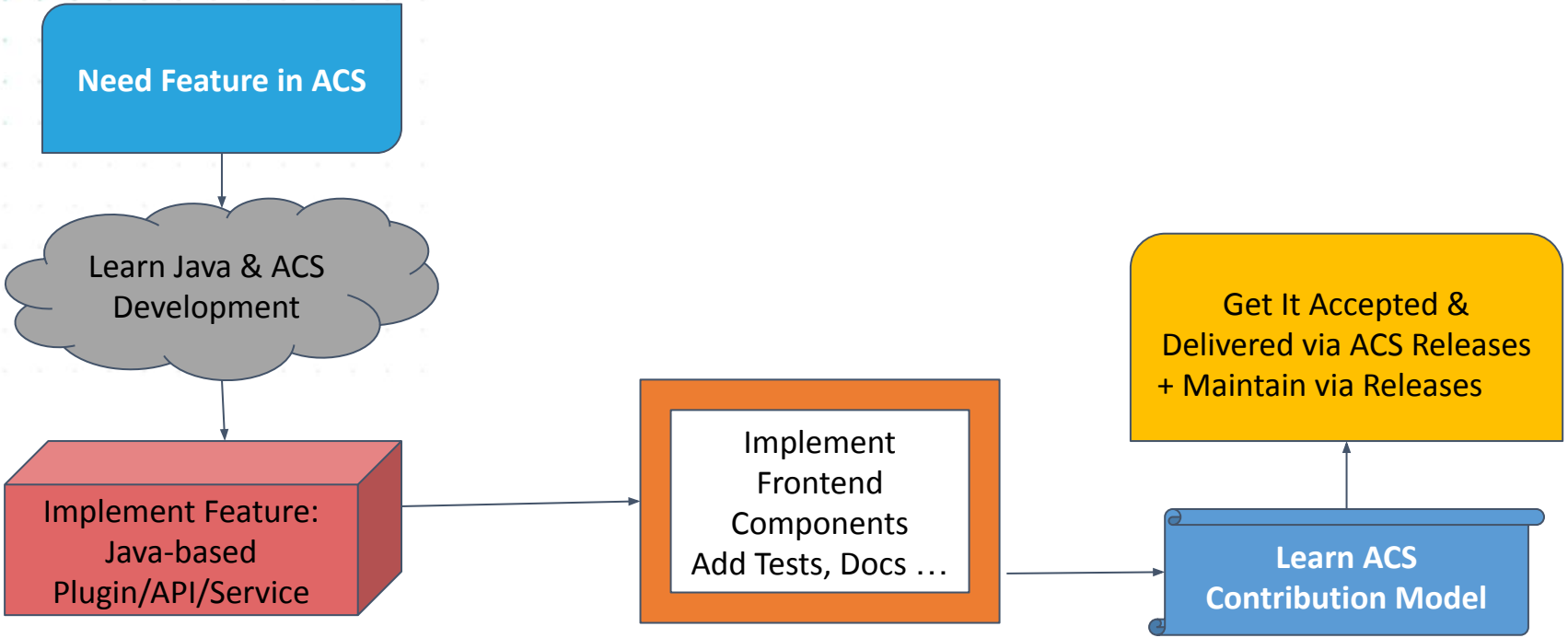

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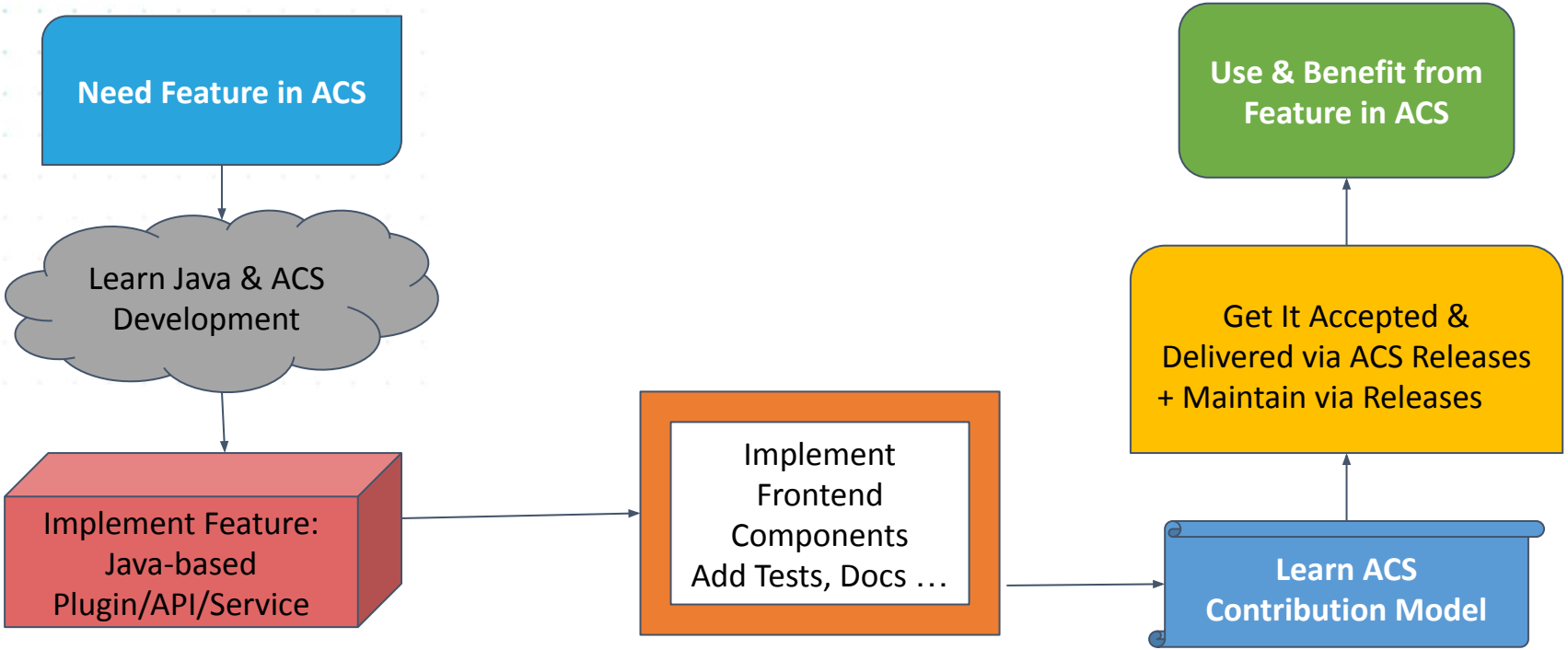

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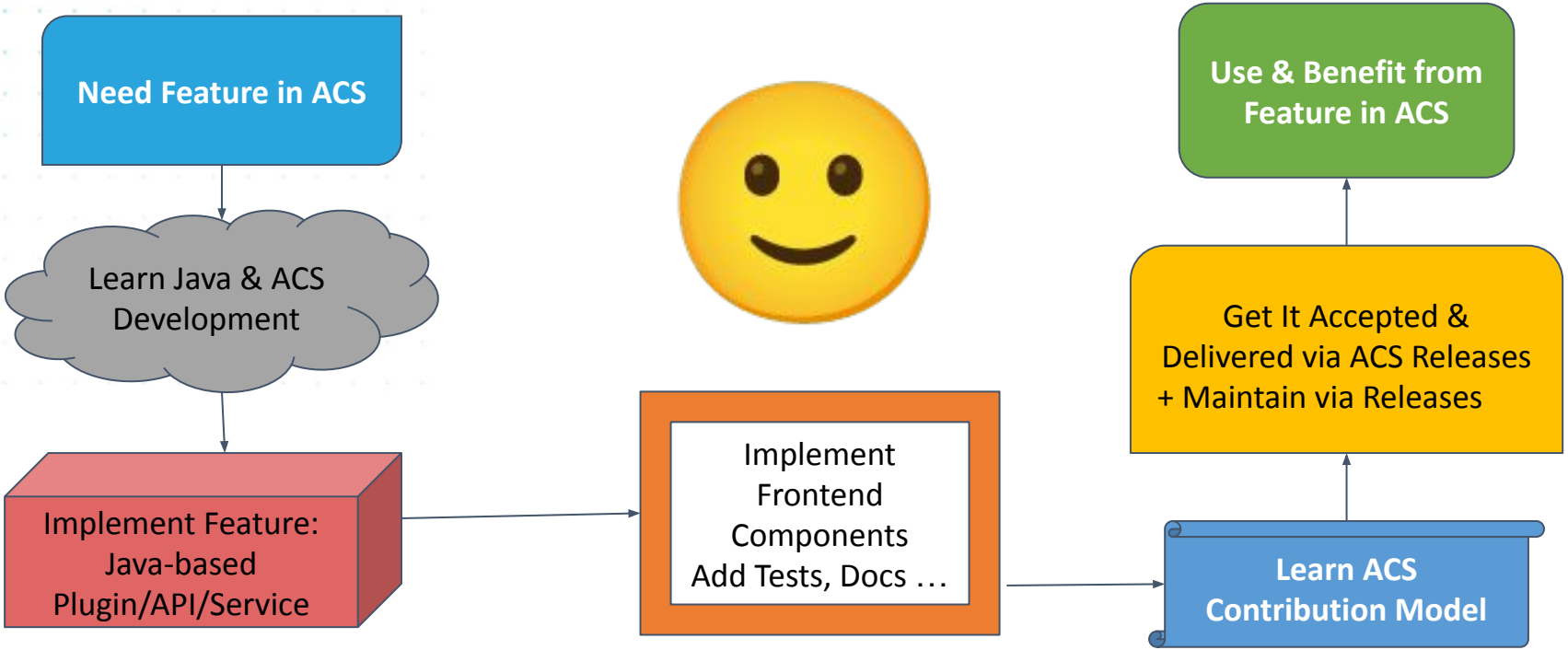

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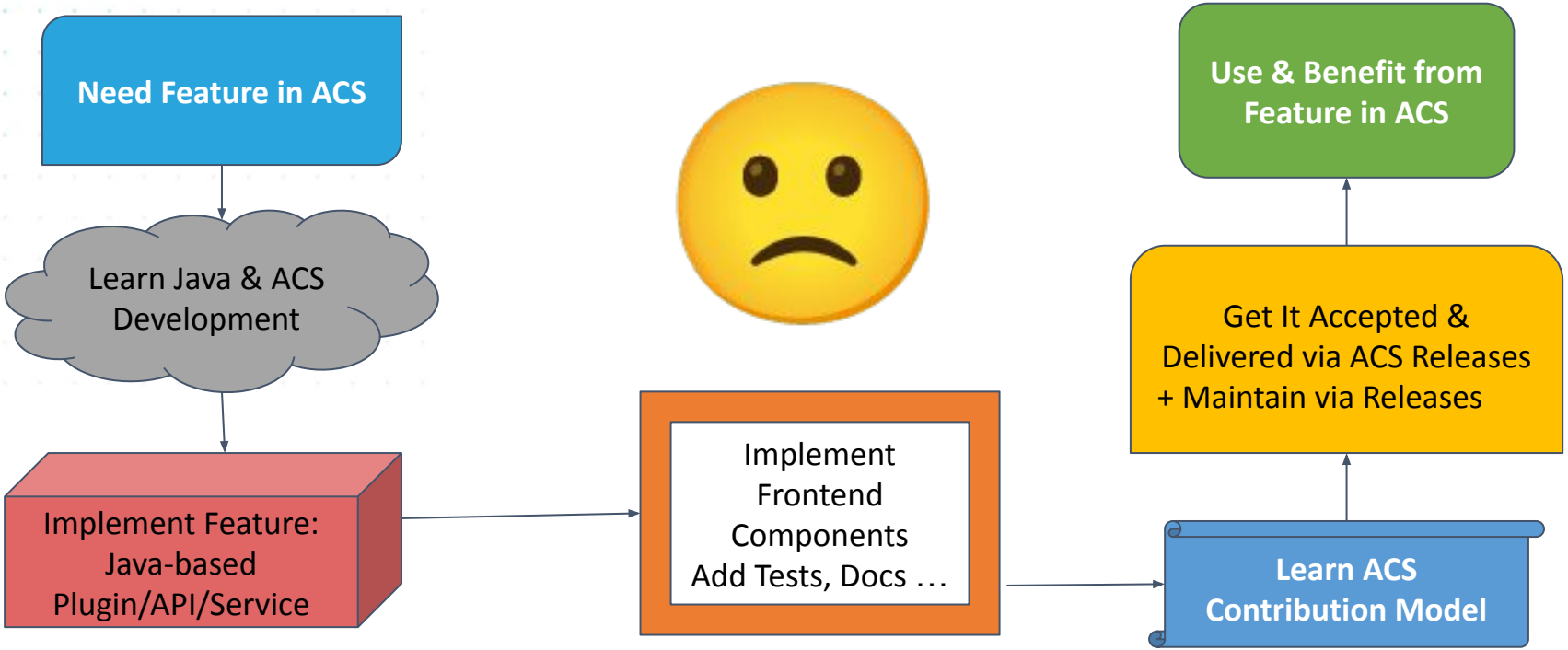

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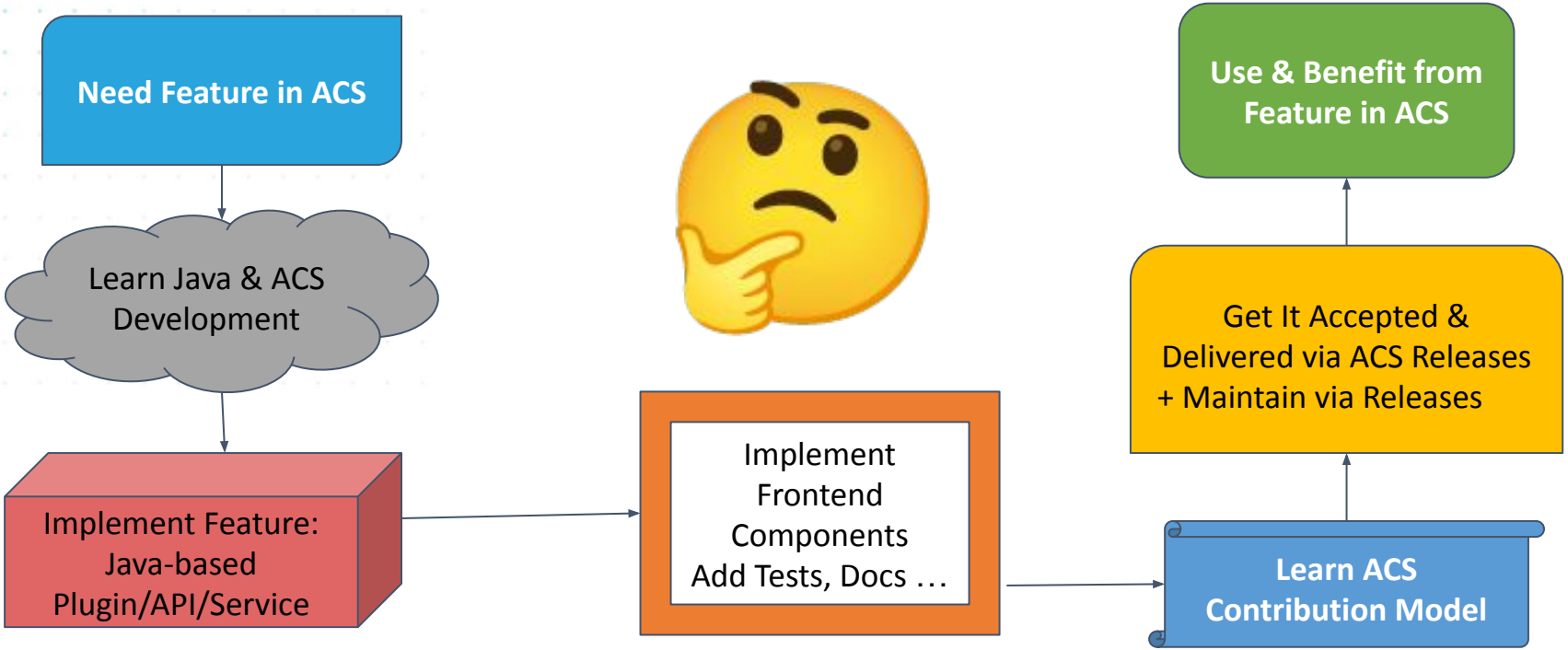
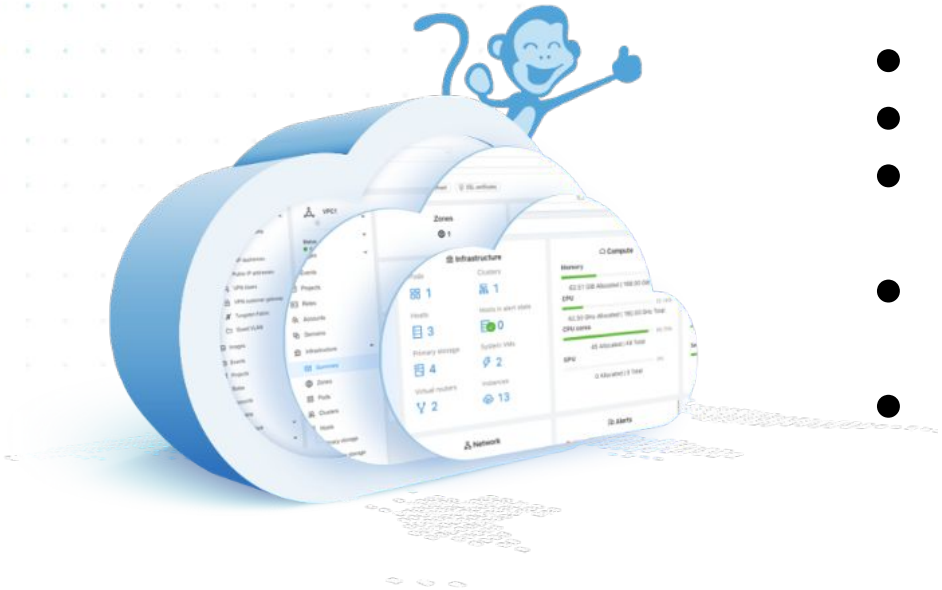


CloudStack Contribution Workflow

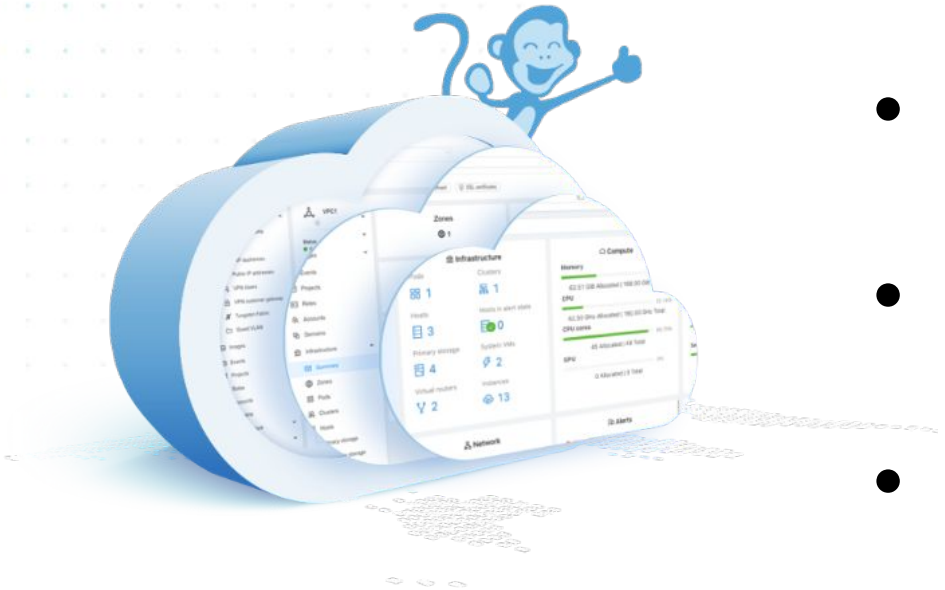


Other Pain points:

- Maintain across releases
- Dependency on community
- Release cycles longer than development/maintenance cycles
- Lag between collaboration, review & iterations
- Needs patience and commitment

CloudStack Contribution Workflow

Advantages



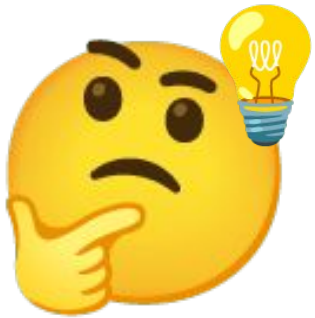
- Slow & Steady - more refined and stable features over time
- Features & changes in native codebase ensure performance and reliability
- Community accepted & maintained codebase, ensures longevity and credibility
- Contributor changes continue to ship with every ACS releases

Vendor Plugin Dev & Management

Some vendors have found a workaround!

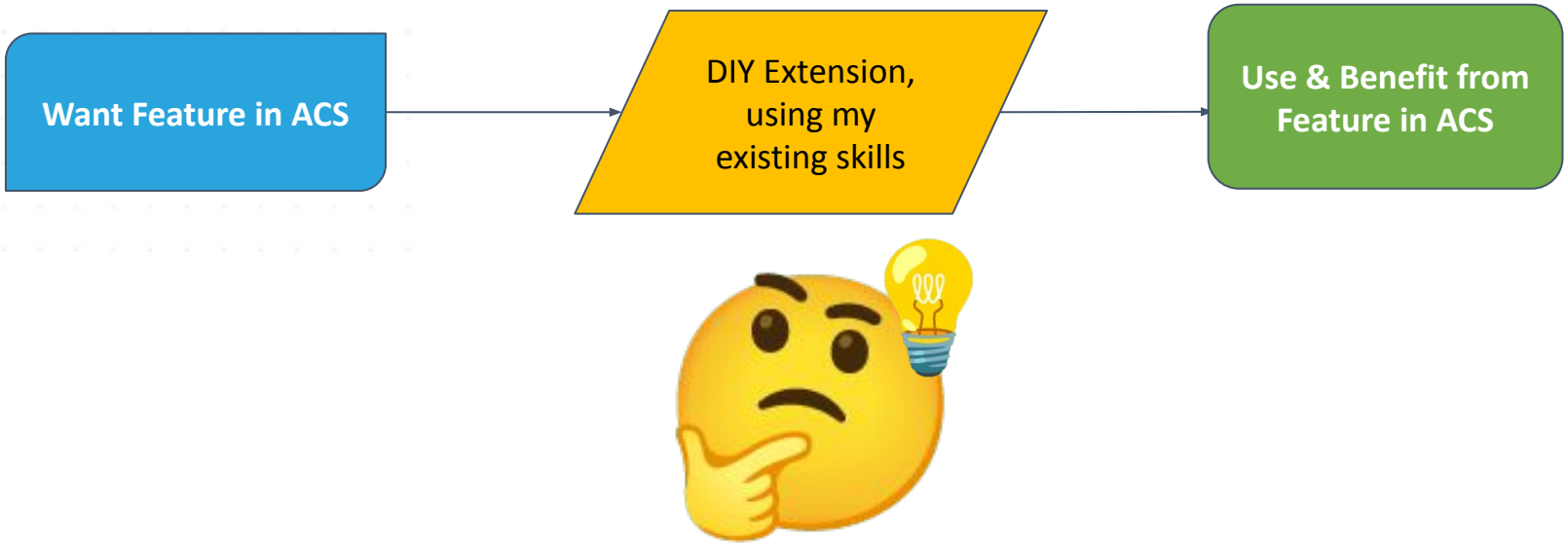
```
root@cms1:/usr/share/cloudstack-management/lib# ls -lahi
total 162M
67141198 drwxr-xr-x 2 root root 4.0K Nov  6 16:41 .
67140694 drwxr-xr-x 6 root root 4.0K Jul 24  2023 ..
67110262 -rw-r--r-- 1 root root 942K Nov  5 12:22 bcpkix-jdk15on-1.70.jar
67110260 -rw-r--r-- 1 root root 5.6M Nov  5 12:22 bcprov-jdk15on-1.70.jar
67110265 -rw-r--r-- 1 root root 1.4M Nov  5 12:22 bctls-jdk15on-1.70.jar
67110264 -rw-r--r-- 1 root root  84K Nov  5 12:22 cloud-plugin-storage-volume-linstor-4.19.1.3.jar
67110765 -rw-r--r-- 1 root root 184K Nov  5 12:22 cloud-plugin-storage-volume-storpool-4.19.1.3.jar
67110263 -rw-r--r-- 1 root root 151M Nov  5 12:22 cloudstack-4.19.1.3.jar
67110261 -rw-r--r-- 1 root root 477K Nov  5 12:22 java-linstor-0.5.1.jar
67110764 -rw-r--r-- 1 root root 2.4M Nov  5 12:22 mysql-connector-j-8.0.33.jar
```

Want Feature in ACS



Use & Benefit from Feature in ACS

Is there something that can allow me to do this?



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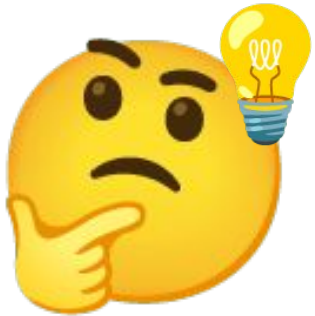
New CloudStack Driver Model



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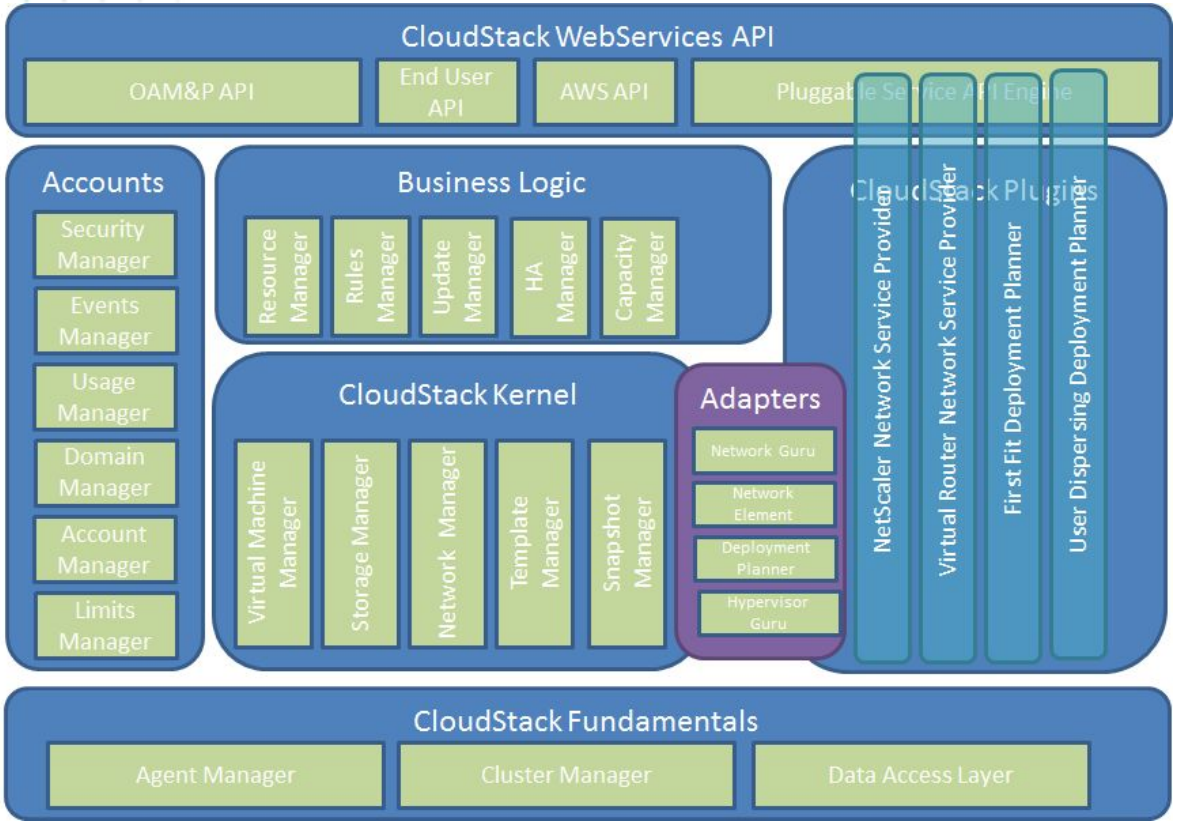
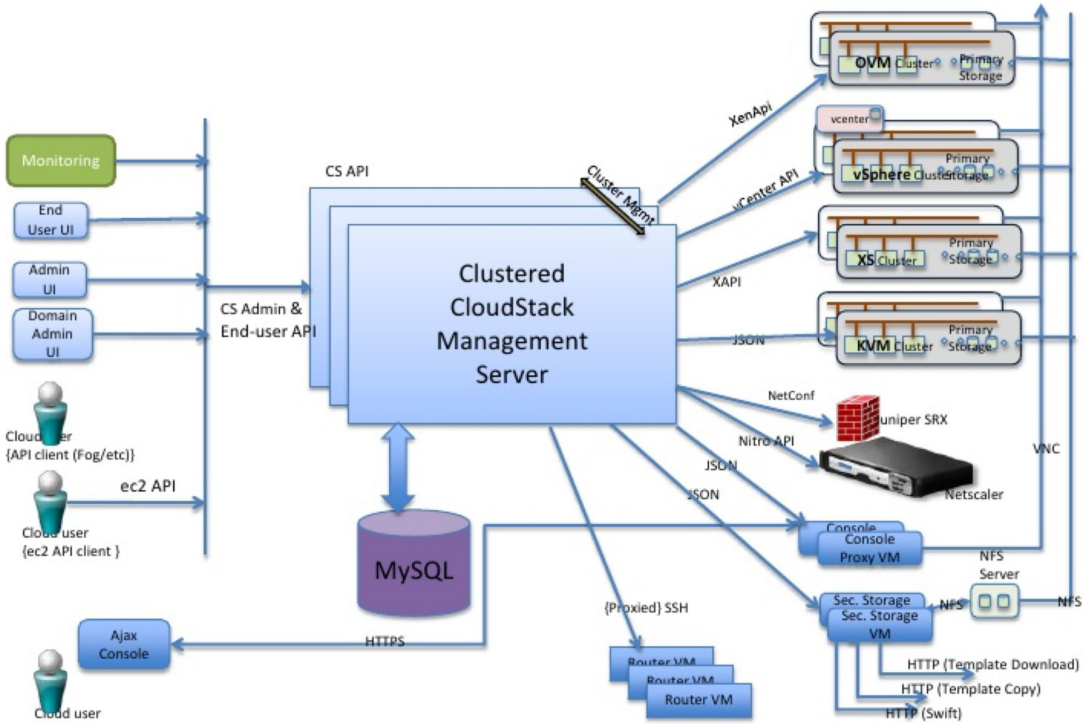
New CloudStack Driver Model

DIY Plugin that integrates with external/3rd party applications?
(RPC, REST-API, binary…?)

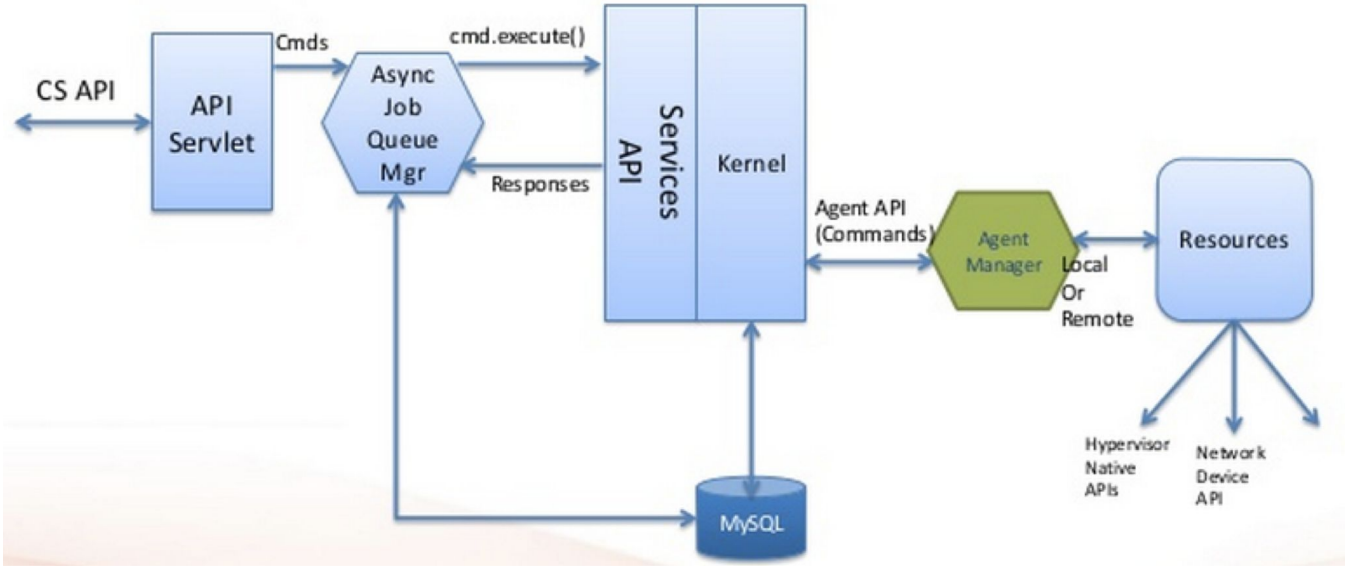

CloudStack WebServices API
OAM&P API
End User API
AWS API
Pluggable Service API Engine
Accounts
Security Manager
Events Manager
Usage Manager
Domain Manager
Account Manager
Limits Manager
Business Logic
Resource Manager
Rules Manager
Update Manager
HA Manager
Capacity Manager
CloudStack Kernel
Virtual Machine Manager
Storage Manager
Network Manager
Template Manager
Snapshot Manager
Adapters
Network Guru
Network Element
Deployment Planner
Hypervisor Guru
CloudStack Plugins
NetScaler Network Service Provider
Virtual Router Network Service Provider
First Fit Deployment Planner
User Dispersing Deployment Planner
CloudStack Fundamentals
Agent Manager
Cluster Manager
Data Access Layer

CloudStack Architecture



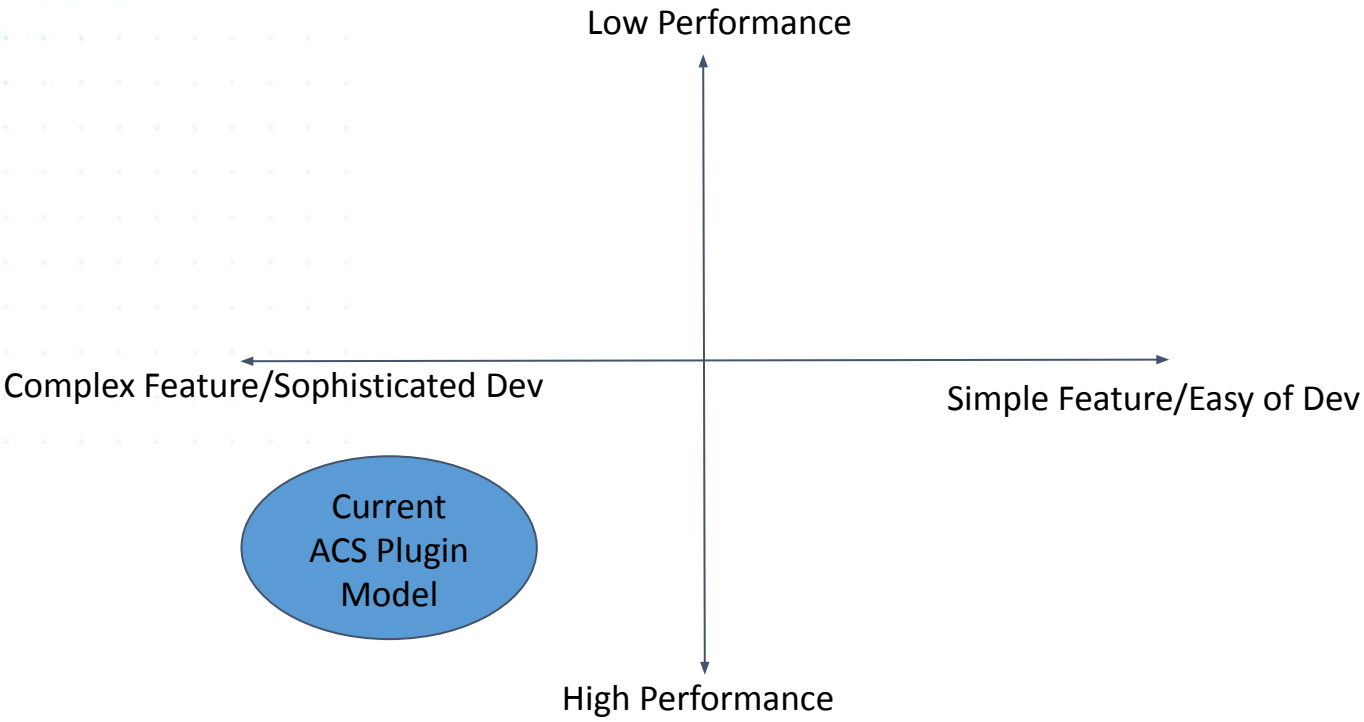
**old diagram, largely relevant

Typical CloudStack API Workflow



Mother of All Plugins Frameworks?

New CloudStack Driver Model



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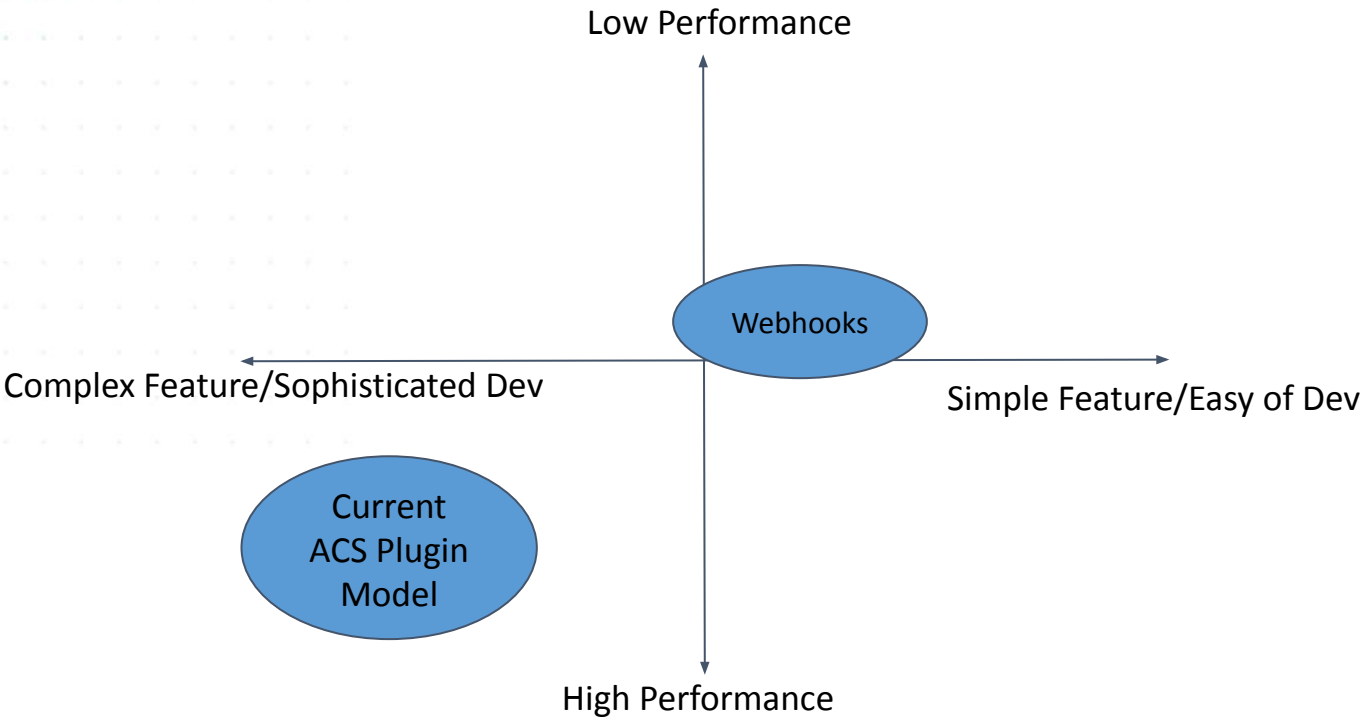

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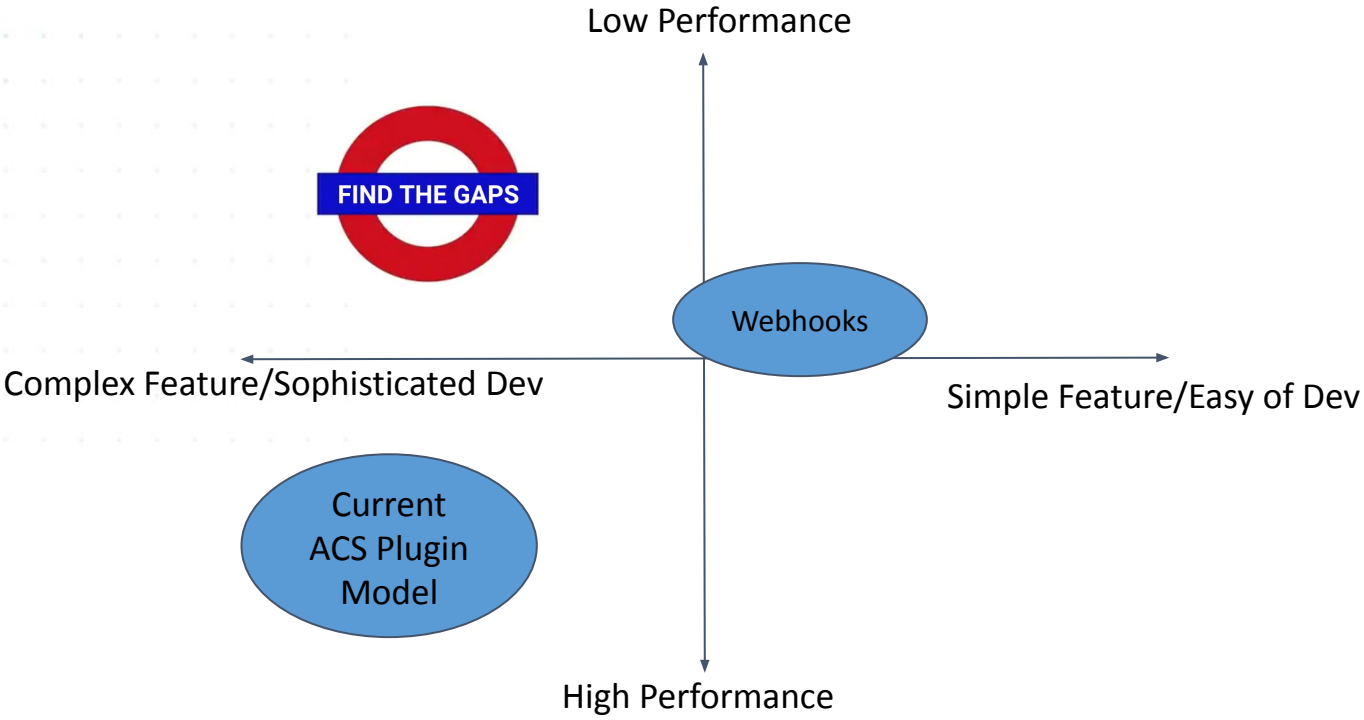

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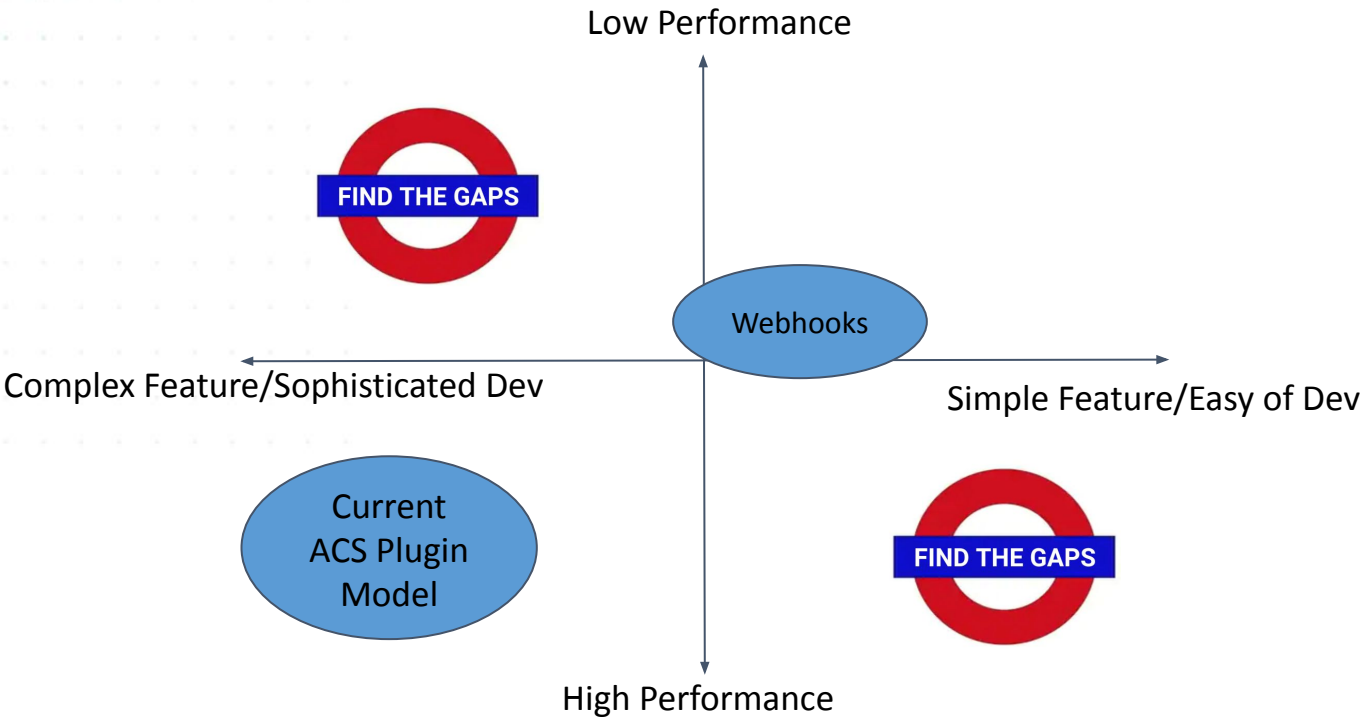

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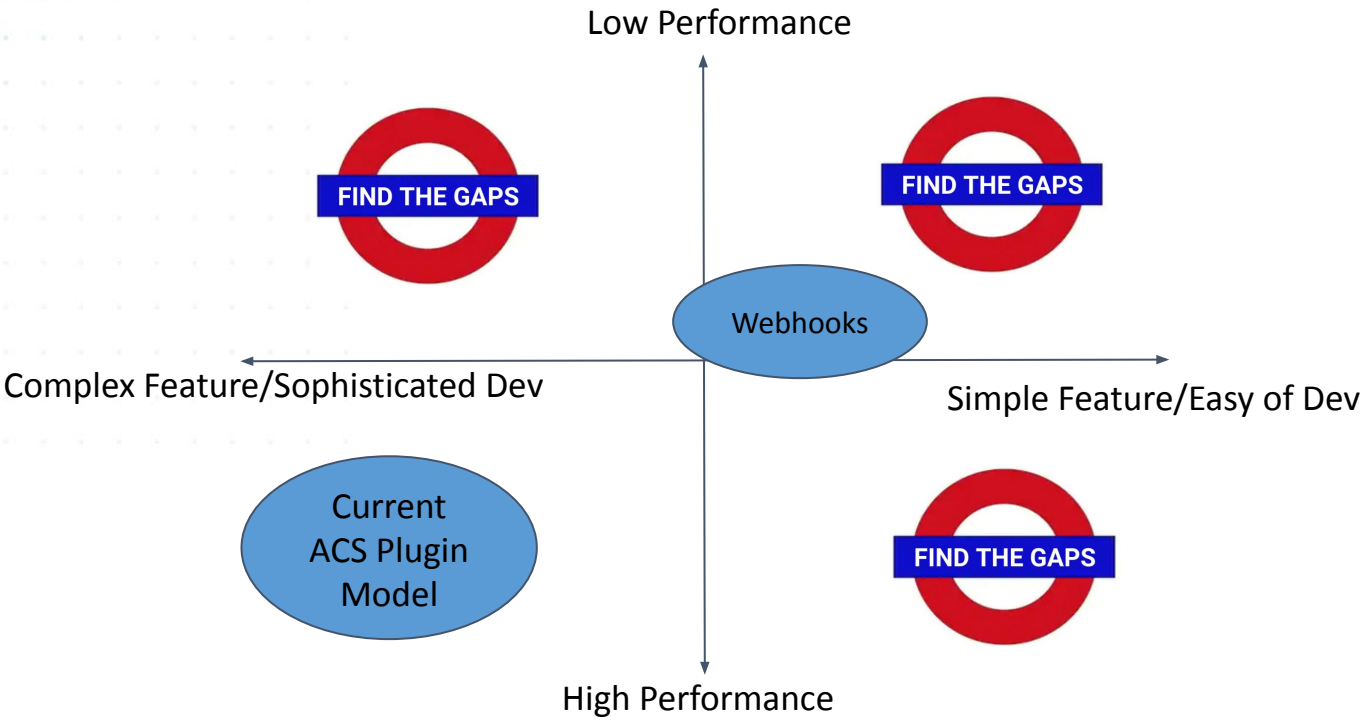

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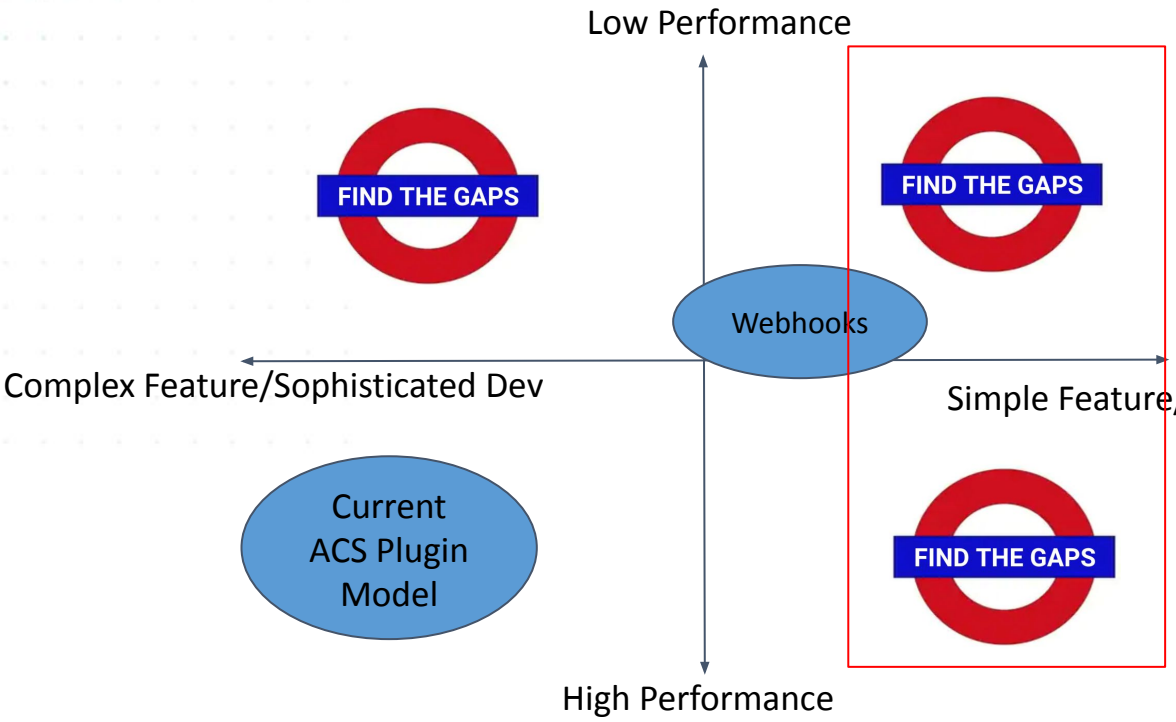
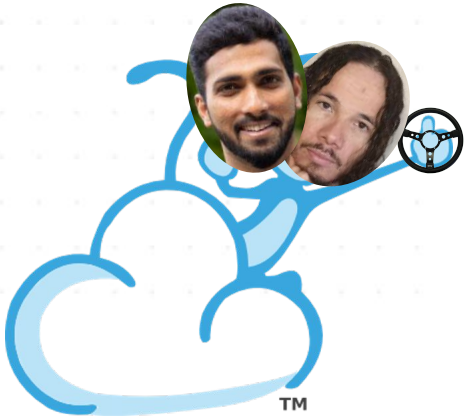


Where are the gaps?

- Simpler Features & Extensions
- Easy of Development

- Implement or Extend existing (not-very-complex) CloudStack functionality
- Empower CloudStack admins (sysadmins, SRE, Ops) and maybe integrators & vendors

Hari's Talk Reference

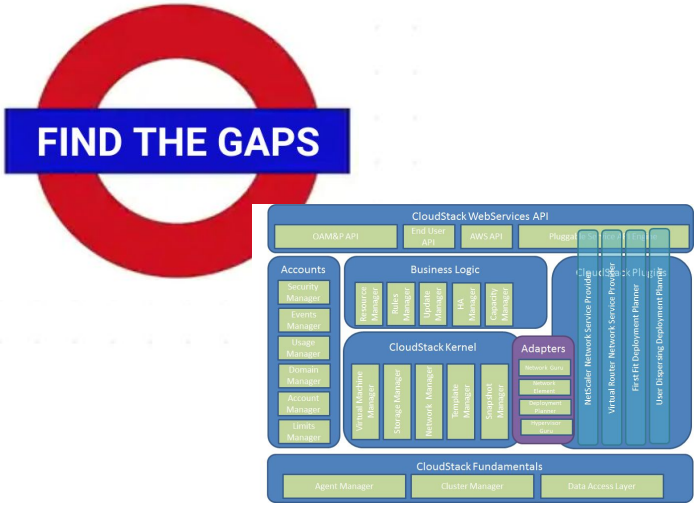


Shoutout to Harikrishna Patnala & Alexandre Mattioli's talk - "External Deployment Integration in CloudStack"

(Earlier Today - Friday, 22st Nov 2024)

New CloudStack Driver Model

Where?



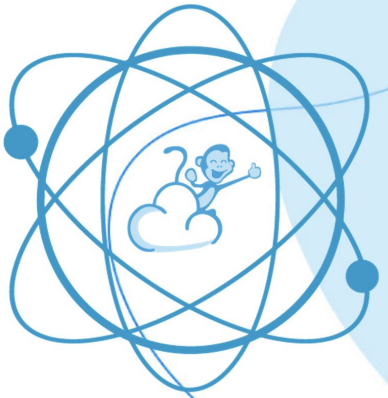
- Anything implementing an *“Adapter”* & *“AdapterBase”* implements a plugin
  - ***239 classes*
- Find ACS Features/Frameworks with Simpler Plugin Interfaces (with simpler methods)

New CloudStack Driver Model

Where: Examples

- User authentication:
  - UserAuthenticator
  - UserTwoFactorAuthenticator
- Network orchestration:
  - NetworkElement
  - NetworkGuru
- Host management:
  - OutOfBandManagementDriver
- VM lifecycle:
  - DeploymentPlanner
  - State transition hook
  - Libvirt Domain XML Rewriter
- Many more…

CloudStack Extensions



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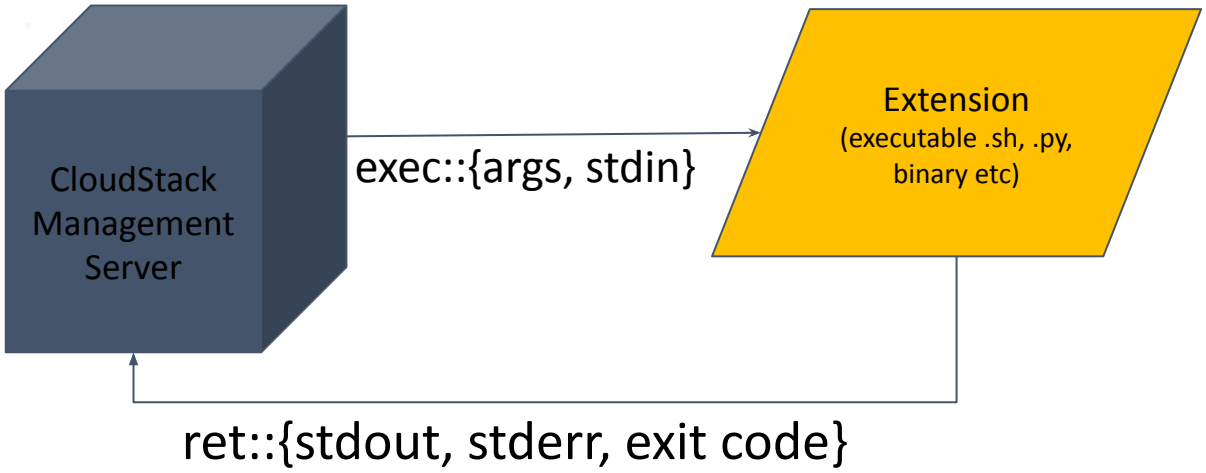
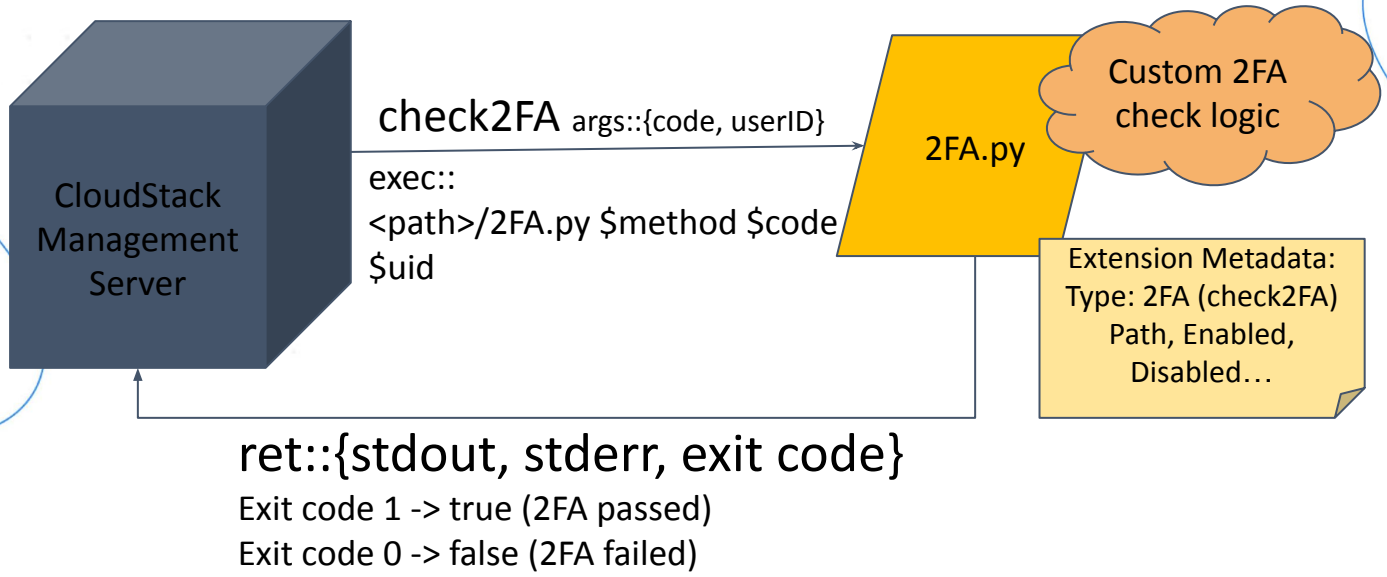


CloudStack Extensions: Example



CloudStack Extensions Store

CloudStack Extension Store

- UI Support:
  - Add/Edit Extensions Content or Path
  - Enable/Disable Extensions
  - Test Extension
- Explore scaffolding extensions based on type (maybe use AI/LLM)

CloudStack Extension Store

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  - Add/Edit Extensions Content or Path
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  - Test Extension
- Explore scaffolding extensions based on type (maybe use AI/LLM)
- Extension Metadata (compatibility, usage, changelog, author etc)
- Allow export/import extensions
- Git/Github-based distribution & discovery
- Allow community to share, adapt, use & learn DIY extensions

Next Steps

Next Steps

- Build support for the proposal
- Iterate I/O RPC interfaces & model
- Gather use-cases & plugin-ideas for extension types
- Propose design and iterate implementation
  - Develop -> Test -> Iterate -> Repeat

Gracias!

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