OPEN MAINFRAME PROJECT

Zowe

To Open Source and Beyond

Today's Presenters

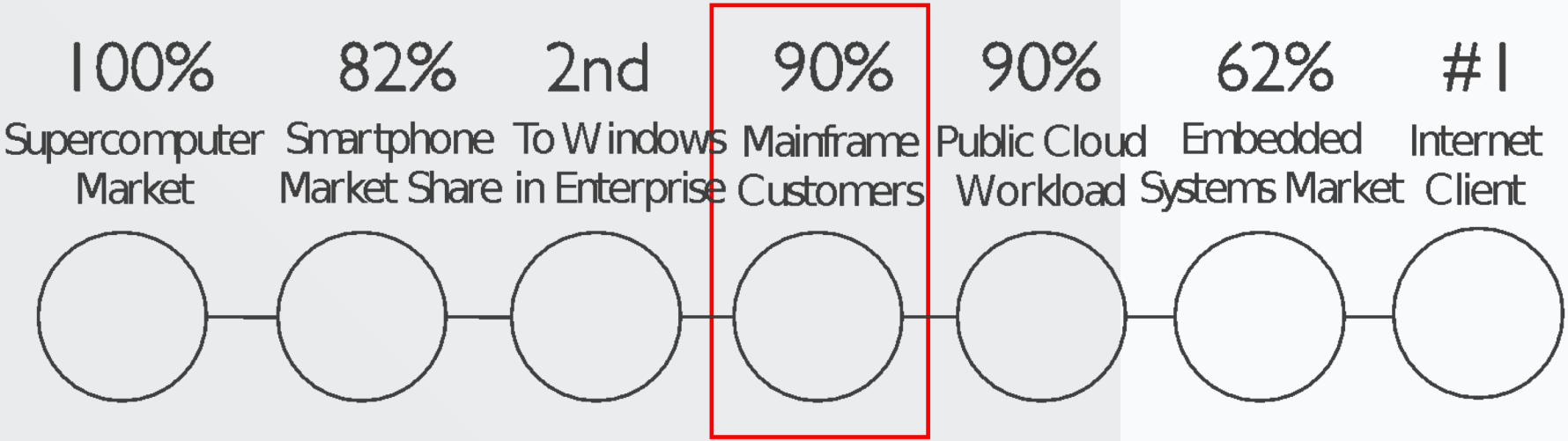
Ivy Li
Senior Manager - Z Automation, IBM

Ashley Li
Zowe Content Designer, IBM

Agenda

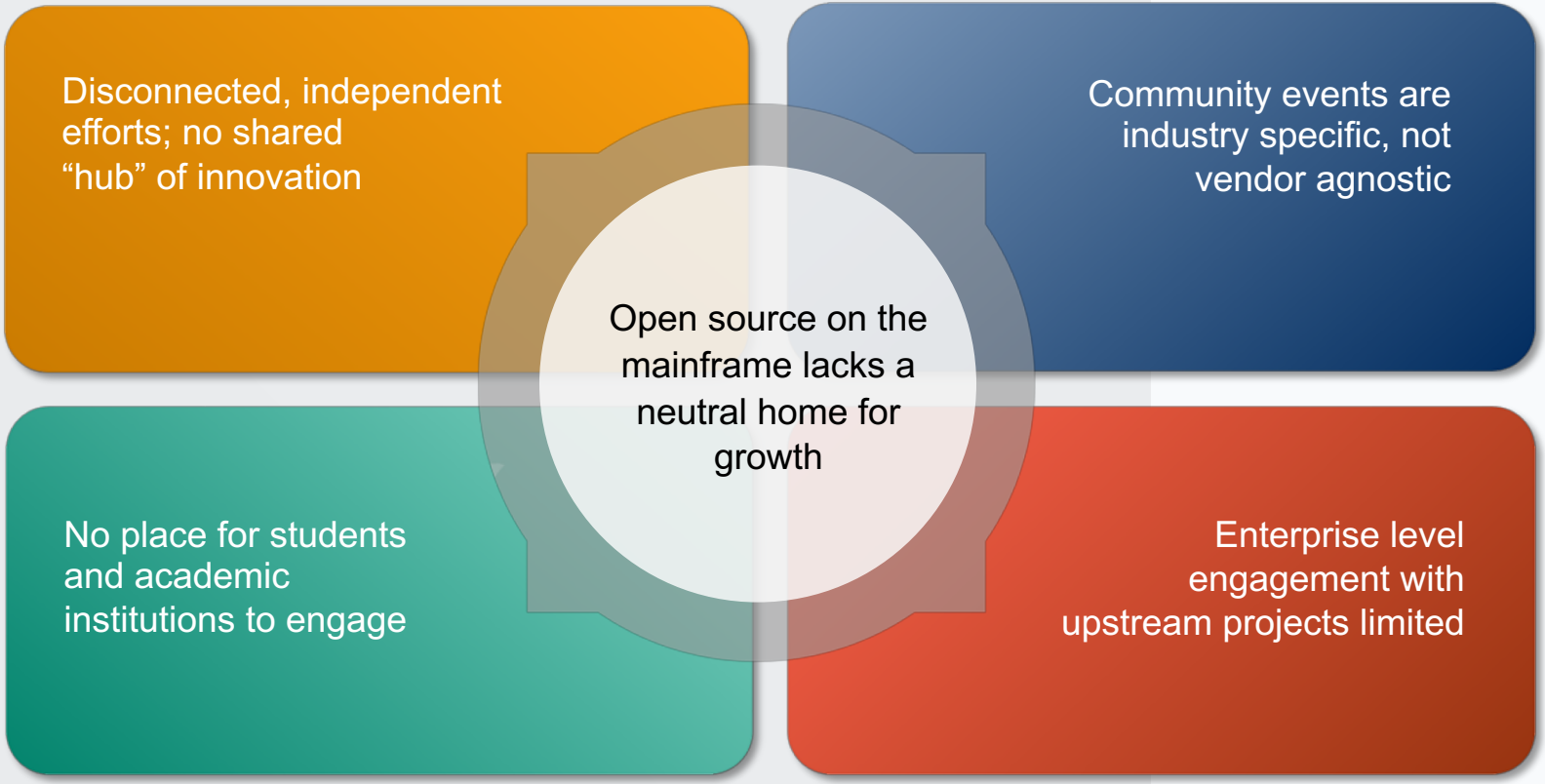
- Open Mainframe Project Introduction
- Introduction to Zowe
- Zowe 1.0
- How to get Involved
- Q&A

Mainframe is key part of Open Source success



Every market Linux has entered it eventually dominates

Open Source on Mainframe challenges



Look to The Linux Foundation

Thankfully, that's where The Linux Foundation® comes in. For nearly two decades, The Linux Foundation has provided unparalleled support for open source communities through financial and intellectual resources, governance structure, IT infrastructure, services, events, and training.

Dedicated to building sustainable ecosystems around open source projects, The Linux Foundation is working with the global technology community to solve the world's hardest problems through open source and **creating the largest shared technology investment in history**.

The Linux Foundation is the umbrella organization for **more than 60 open source projects** accelerating open technology development and commercial adoption. Some of the game-changing initiatives hosted by The Linux Foundation include:

OPENCHAIN · Let's Encrypt · JS Foundation · OPEN CONTAINER INITIATIVE · CLOUD NATIVE COMPUTING FOUNDATION · Xen Project · Core Embedded Linux Project

OPEN DAYLIGHT · CORD · CORE INFRASTRUCTURE INITIATIVE · OPNFV · CLOUD FOUNDRY · node JS · yocto PROJECT

Open Mainframe Project community traction

3
years since launch

29
Supporting organizations

6
Hosted Mainframe centric Open Source Projects

100+
Students impacted through internships and academic programs

Members

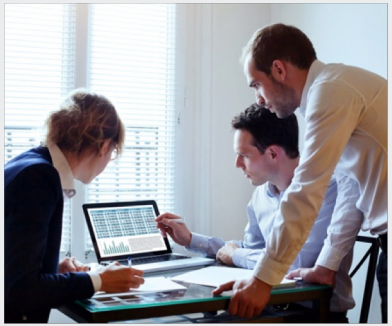
Academic Mainframe Consortium
ADP A more human resource.
Albany State University University System of Georgia
ca technologies
CIAC
docker
East Carolina University
EMA fit for mainframe
EPSI l'École d'ingénierie informatique
Goethe Universität Frankfurt am Main
GSE Guide Share Europe UK Region
GT Software
Hochschule Coburg
HoGent
htl donaustadt zertifiziert nach ISO 14001 validiert nach EMAS
IBM
Universität Leipzig
MARIST
North Carolina Agricultural and Technical State University
Rocket
SHARE Educate · Network · Influence
Sine Nomine Associates
SUSE
ubuntu Supported by Canonical
University of Bedfordshire
University of Wolverhampton
VCU
VICOM Infinity
William Paterson University

Open Mainframe innovation thrives here

- OMP provides a vendor-neutral home for mainframe-centric open source projects
  - Code hosting/infrastructure
  - Governance
  - Legal/Trademark defense
  - Ecosystem development
- LF staff support project communities establishing guidelines and best practices to enable diverse community growth and adoption
- Our philosophy creates natural collaboration opportunities between mainframe-centric open source projects

Project lifecycle, guidance, and proposal process openly defined at
https://github.com/openmainframeproject/tsc/tree/master/process

Sustained mainframe support in the broad open source community through the Supported Projects program

Infrastructure	Developer support	Market awareness	Governance/IP Home
			

Participating Open Source Projects include

debian

alpine Linux

gentoo linux

PostgreSQL
the world's most advanced open source database

fedora

Mission of the Open Mainframe Project:

Build community and adoption of Open Source on the mainframe

- Eliminating barriers to Open Source adoption on the mainframe
- Demonstrating value of the mainframe on technical and business levels
- Strengthening collaboration points and resources for the community to thrive

Eliminating barriers to Open Source adoption on the mainframe

- Engaged as central expert in demonstrating the mainframe as a viable open source platform, with compelling advantage.
- Promotion of modern application and workload examples on the mainframe
- Growing career opportunities and academic community engagement
- Hosting and participating in local programming and promotion of Open Source on the mainframe
- Sponsorship of global initiatives and contests to grow enthusiasm for the platform

Demonstrating value of the mainframe on technical and business levels

- Showcase of technical and business case studies through blogs, white papers, and other media.
- Champion software and hardware solutions with clients

Strengthening collaboration points and resources for the community to thrive

- Engagement through Technical Steering Committee projects and independent projects by members
- Visibility to tools, resources, and community forums to tackle technical challenges
- Career opportunities from internships through retirement

Internship and academic engagement programs are putting mainframe in the hands of the next generation

Summer Internship Program

Blockchain Hackathon for EPSI University in France

VCU Capstone Partnership

27
Interns sponsored

14
Supporting academic institutions

100+
Students impacted

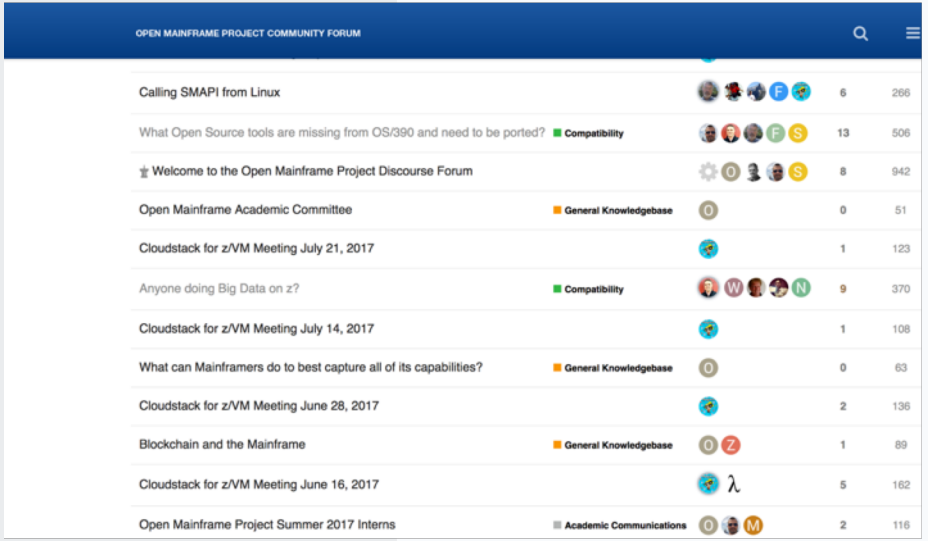
Telling the "mainframer" story

- Monthly interview series that highlights both new and old in mainframe
- Goal is to showcase why people have mainframe in their careers and their views of the technology and career field
- Read and listen at https://www.openmainframeproject.org/category/blog/i-am-a-mainframer

Bringing together the open source and mainframe conversation

Sponsored Meetup Program
https://www.openmainframeproject.org/meetup-program

Slack Channel
https://slack.openmainframeproject.org



Community Forums
https://community.openmainframeproject.org/

How to participate in Open Mainframe Project

Community discussion and collaboration - both virtually and at regional events.

6 Shared R&D open source projects - or bring your project to be hosted here

Corporate sponsorship for showing stewardship in the community

Learn more about the Open Mainframe Project

- Find out more and subscribe to our newsletter at www.openmainframeproject.org
- Organizational membership opportunities at https://www.openmainframeproject.org/about/join or email at membership@openmainframeproject.com

OPEN
MAINFRAME
PROJECT

Zowe Overview

Introducing Zowe

- An extensible framework for connecting applications and tools to mainframe data and applications.
- Aims to make the mainframe an integrated and agile platform within the changing IT architectural landscape.
- First open source project on z/OS. All code is licensed under the Eclipse Public License version 2.0

Zowe

Quick Facts about Zowe

- **Zowe 1.0.0 Announce at THINK SF 2019**
  - 100% Open Source (EPL 2.0)
  - Defined extensions points
  - Framework ready for commercial exploitation

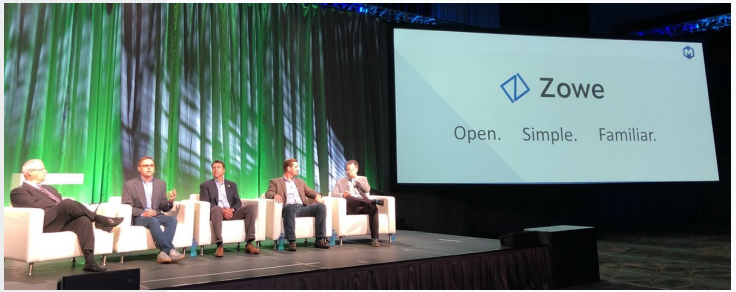
- Pronounced as “Zoe” – [zoh-ee] in English
  - Not an acronym – just a simple, fun and easy name
  - Using the spelling “Zowe” allowed us to trademark

- An open source project under the Open Mainframe Project (OMP), a collaborative project within the Linux Foundation

- IBM, Rocket Software and CA Technologies are founding members

- **Generally Available on Feb 8th, 2019**

Zowe

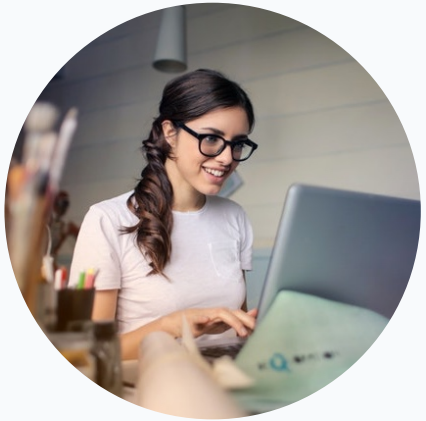


Why Zowe ?

Information Technology is undergoing a revolution of changing architectures

Co-Existence With Other Cloud Models

Protecting Current and Future Investments



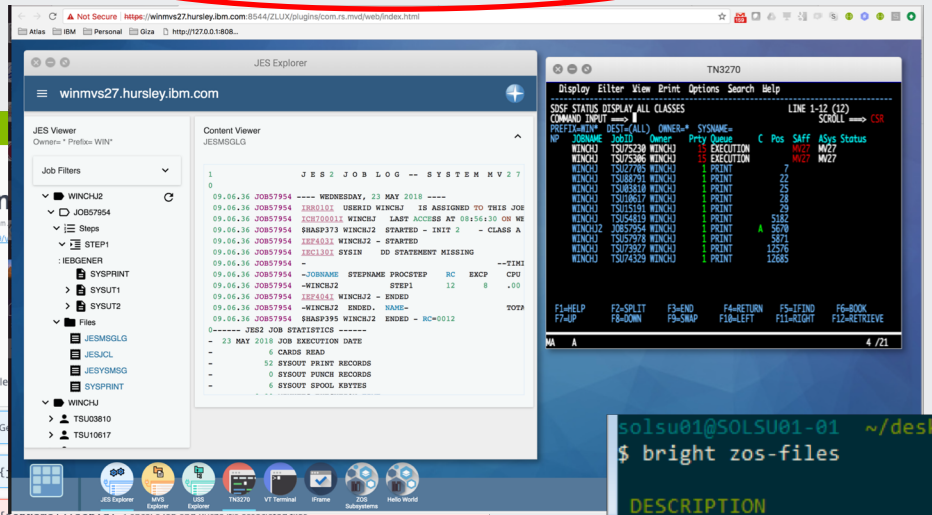
Simple and Familiar

Zowe Vision Statement

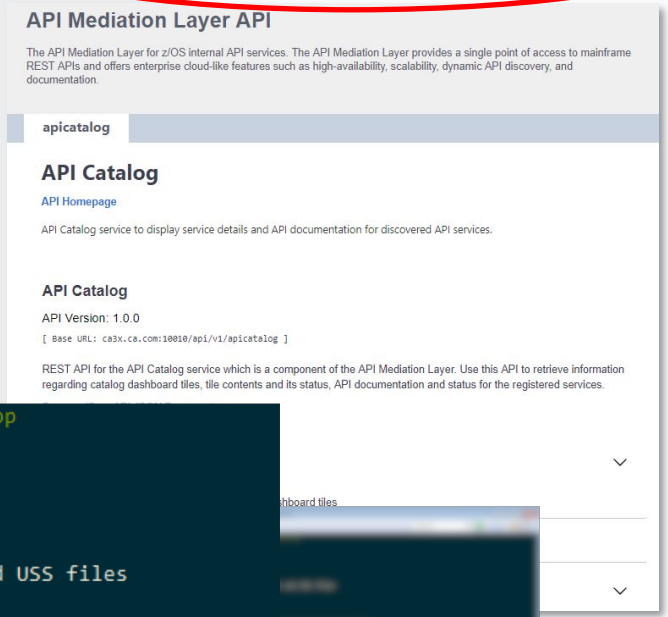
- Attract new people
  - ✓ Demystify the Z platform
  - ✓ Enhance integration and consumability
  - ✓ Promote Open community of practice
- Reduce learning curve
  - ✓ Improve productivity
  - ✓ Modern, platform-neutral interfaces
  - ✓ Cloud-like experience
- Simplify architecture
  - ✓ Reduce operational overhead
  - ✓ Improve co-existence
  - ✓ Enable rich ecosystem of free and commercial solutions

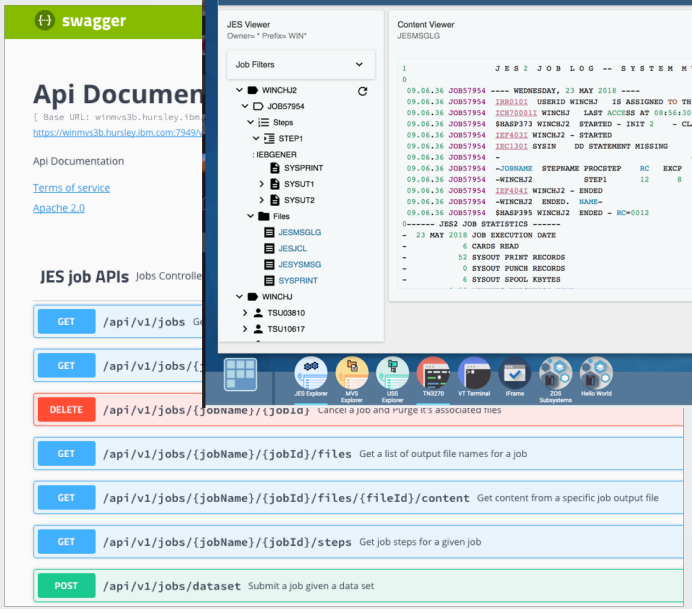
What's in Zowe?

Browser-based Web Desktop

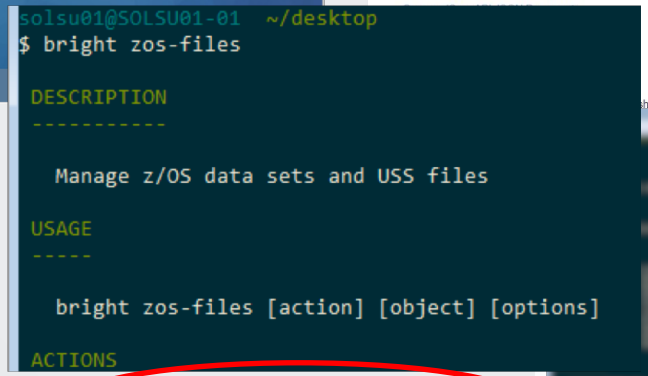


API Mediation Layer
(Gateway, Discovery Service, Catalog)





Swagger-defined z/OS REST APIs

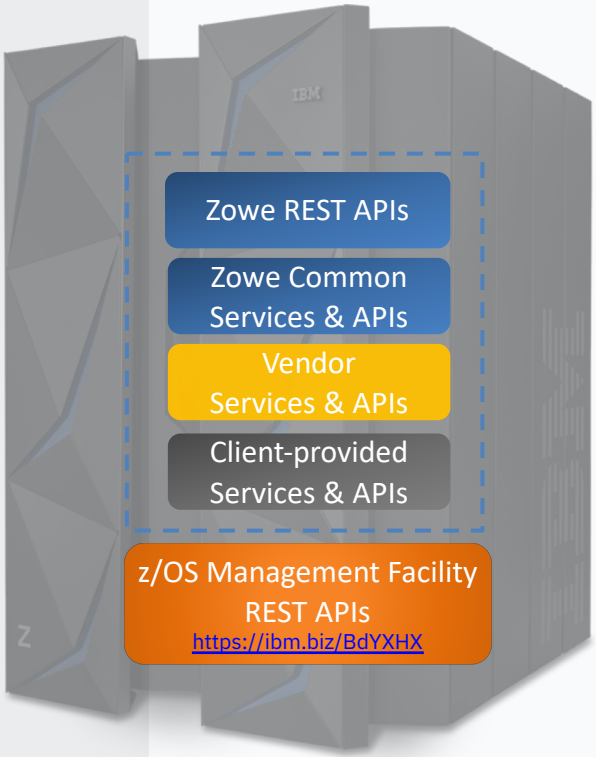


Node.js- based CLI

Zowe REST Services – API economy for deep integration

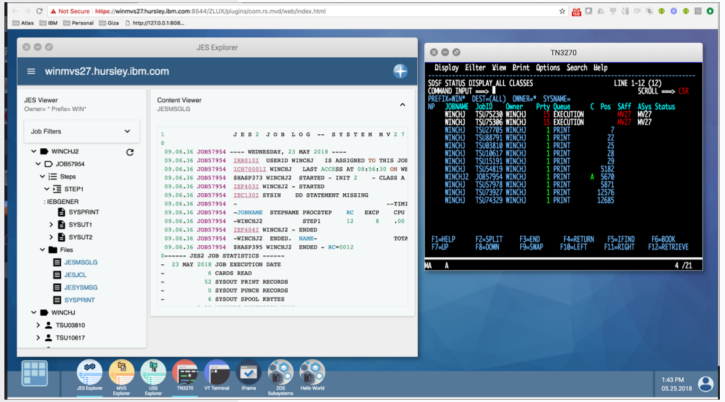
- Industry standard REST interfaces to z/OS resources that are language and platform neutral, stateless and scalable
- Foundational building blocks for system services

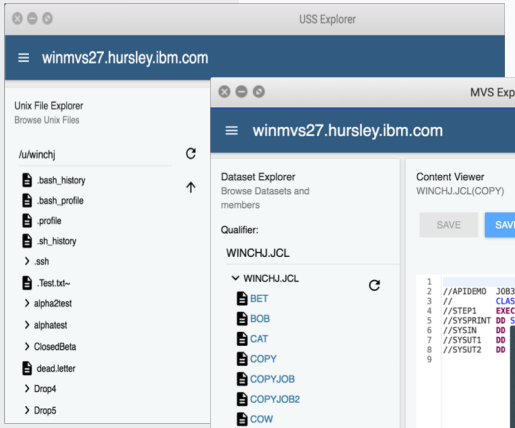
  - ***Dataset APIs***
    - Create, read, update, delete, and list data sets
  - ***JES APIs***
    - View the information and files of jobs, and submit and cancel job
  - ***USS APIs***
    - Create, read, update, and delete USS files
  - ***System APIs***
    - View information about PARMLIB, SYSPLEX, and USER



Zowe Web Desktop – An app container in a browser

- Known as **zLUX**, the Zowe Web UI is a virtual desktop system that offers a rich and open platform for a web-based mainframe user experience.
  - ***Mainframe Virtual Desktop***
    - A web-based window manager that provides full screen interactive experience
  - ***Zowe Node Server***
    - Runs zLUX; uses Express.js as web service framework for communication between applications and z/OS services and components, pre-reqs Node.js for z/OS
  - ***ZSS Server***
    - Provides secured REST API services
  - ***Application plug-in***
    - Dataservices, Configuration dataservice, URI broker, app-to-app communication, Error reporting UI, Logging utility
  - ***Explorers***
    - JES, MVS, USS explorers
    - Basic editing support for REXX and JCL





UI Challenge

- Good UIs use your intuition to gain insight and complete high level tasks
- Coexistence with CLI where low level tasks & automation exceed

- z/OS doesn't provide tech to present a UI on the level of those of consumer devices
- X11 present on USS, but not much software support

Previous solutions to the problem fall short

- Fat clients installed on end-user machines
  - Adds prereqs to each machine
  - May be windows-only
  - May replicate data already on Z

- Websites
  - Scope limited to targeted category of software
    Extensibility limited by traditional capabilities of HTML/CSS/JS
  - Limited communication with other software/sites for logical workflow
  - Some based on technology becoming unsupported (activex, java plugin)

UI Solution

Zowe App Framework

- Create an extensible webpage for running multiple web applications simultaneously

- UI seen as a so-called "Single Page App" (actions done without
- navigating browser between pages)

App framework makes it possible to have multiple apps, written by different parties, using different web technologies, to coexist within the same page

Dev freedom to code using different web tech
Security & Compatibility – isolation of framework inner objects from Apps, isolation between Apps (JS, HTML, CSS)
Performance – page load speed unaffected – Apps loaded only first opening
Minimal memory consumption – common libraries are included in base, Apps can use for "deduplication"
Flexibility – Design by interface allows for changes in layout & technology support

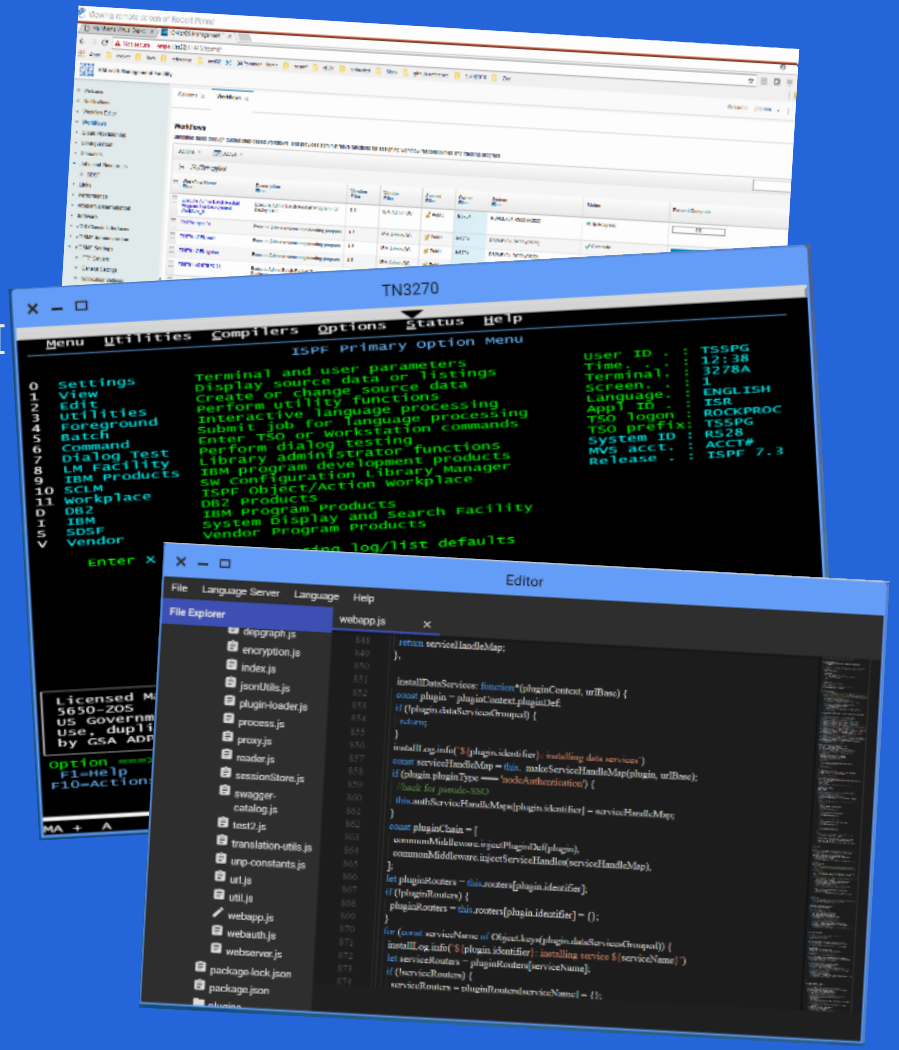
UI Solution

Goal: one intuitive & modern place for all z/OS UIs

- Existing websites can be presented in UI via iframe wrapper, mediation layer for solving CORS
- Terminal (3270 and SSH) present for compatibility
- Modern web libraries rich enough for representing look&feel seen in fat clients

Zero install: Pure HTML, CSS, and JS in a browser

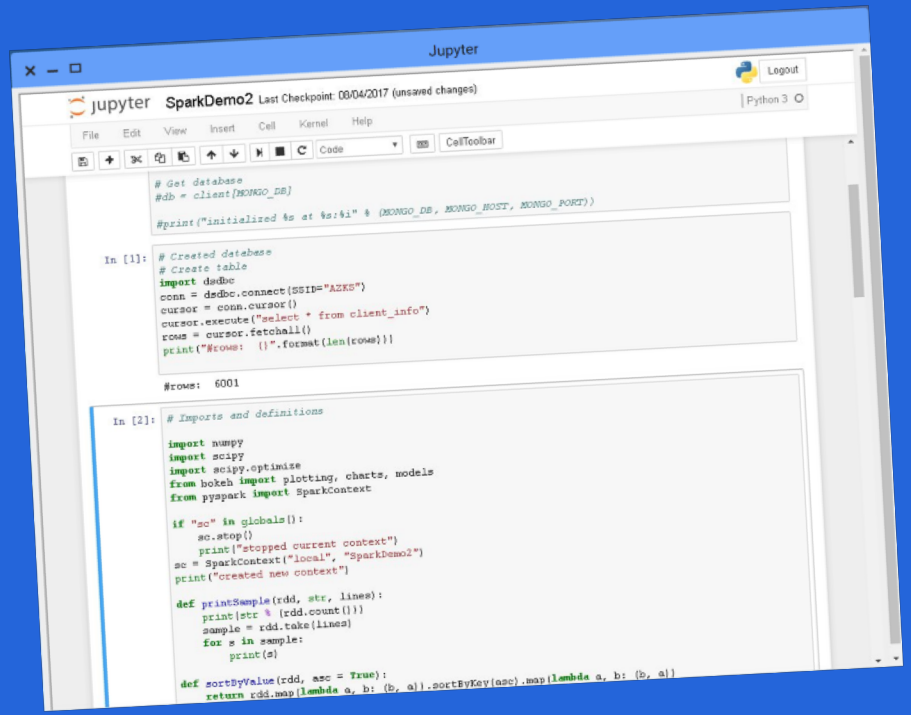
- Chrome, Firefox, Edge, Safari – use it on a chromebook or a desktop



Want’s a web dev to do ?

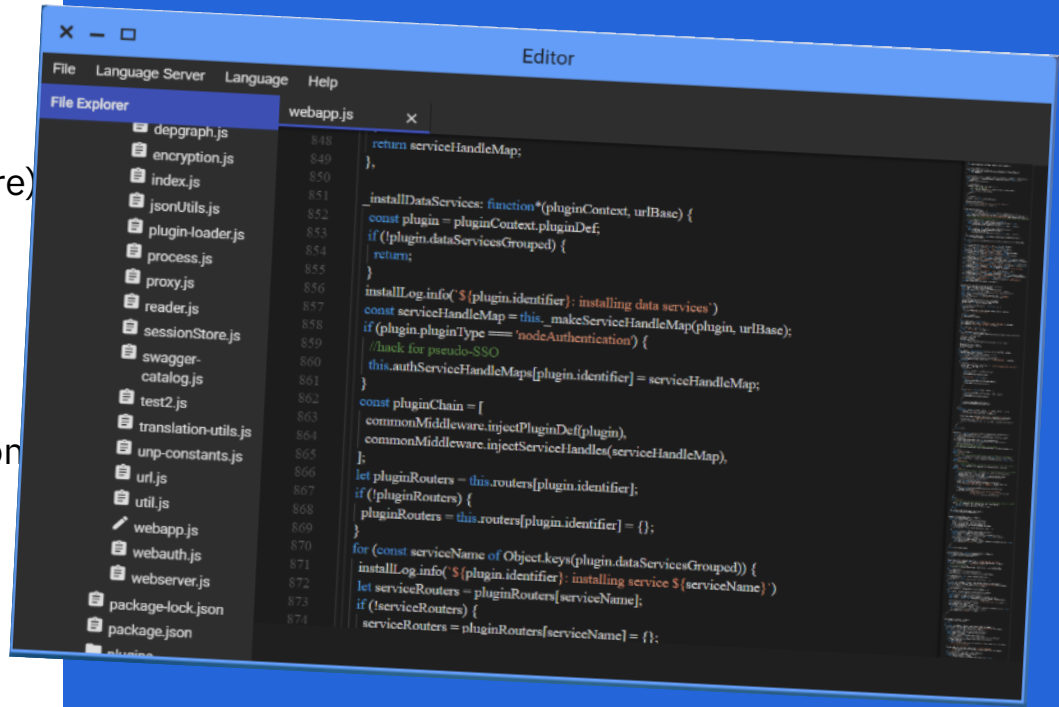
Making an App for Zowe isn’t so different, and you have choices

1. Have a preexisting site?
- Connect its server to the mediation layer
- Make an iframe App that references the mediation layer link



What's a web dev to do ?

Making a new program?
Code in React or Angular (Vue, etc possible in future)
Utilize App framework base webpack config, and typescript config (typescript not required, but very recommended)
    Biggest difference – webpack config clashes with dev tools such as angular cli
Minor zowe accommodations for entry, css isolation (ex css modules), and windowed-awareness (events)
Growing collection of optional-but-recommended framework features
    Notification API, Settings storage API
    URI abstraction API, App2App communication API, Globalization API
    Logging API, Backend APIs for building REST/WS

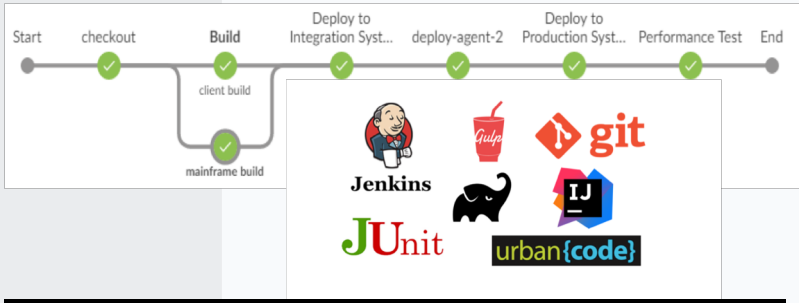


Zowe CLI – Enables cloud-like access to mainframe

- Enables app developer and DevOps engineers to interact with the mainframe easily through a CLI from any terminal on Windows, MacOS, Linux
- Easily integrates with IDEs, shell commands, bash scripts, and build tools; installs using NPM

  - ***Interact with mainframe files***
    Create, edit, download, and upload mainframe files (data sets) directly
  - ***Submit jobs***
    Submit JCL from data sets or local storage, monitor status, view and download output automatically
  - ***Issue TSO and z/OS console commands***
    Issue TSO and console commands to the mainframe directly
  - ***Integrate z/OS actions into scripts***
    Build local scripts that accomplish both mainframe and local tasks
  - ***Produce responses as JSON documents***
    Return data in JSON format on request for consumption in other programming languages
  - ***CLI Plug-Ins***
    Access to CICS and DB2

Build | Test | Deploy




```
GROUPS
------

  plugins                Install and manage plug-ins
  profiles               Create and manage configuration profiles
  provisioning | pv      Perform z/OSMF provisioning tasks on Published Templates
                         in the Service Catalog and Provisioned Instances in the
                         Service Registry.
  zos-console | console  Issue z/OS console commands and collect responses
  zos-files | files      Manage z/OS data sets
  zos-jobs | jobs        Manage z/OS jobs
  zos-tso | tso          Issue TSO commands and interact with TSO address spaces
  zosmf                  Interact with z/OSMF

OPTIONS
-------

  --version  | -V (boolean)

     Display the current version of CA Brightside

GLOBAL OPTIONS
--------------

  --response-format-json  | --rfj (boolean)

     Produce the command response as a JSON document

  --help  | -h (boolean)
```

Challenge

Michelle

AWS CLI.
Azure CLI, …

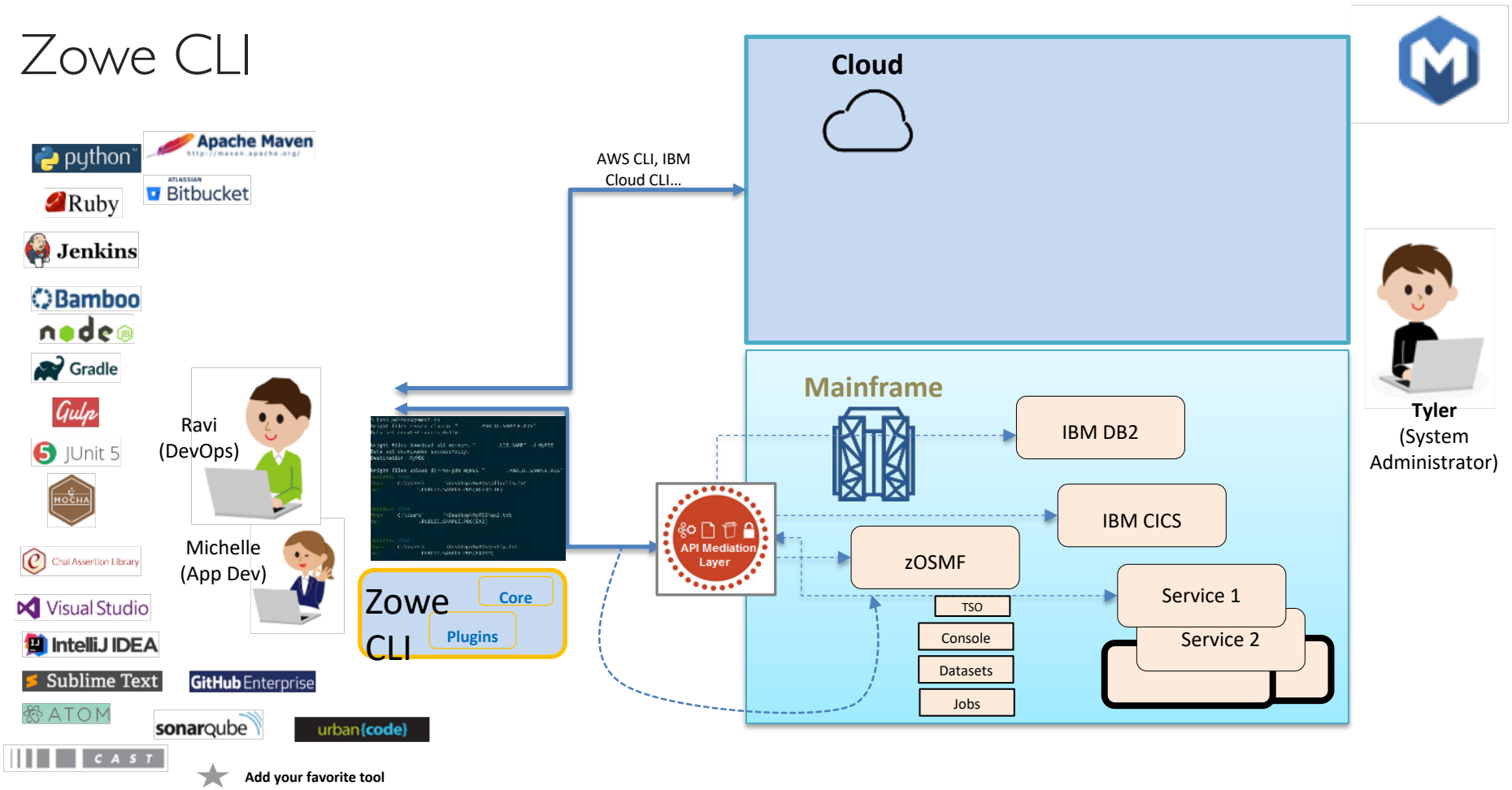
?

Cloud

Mainframe

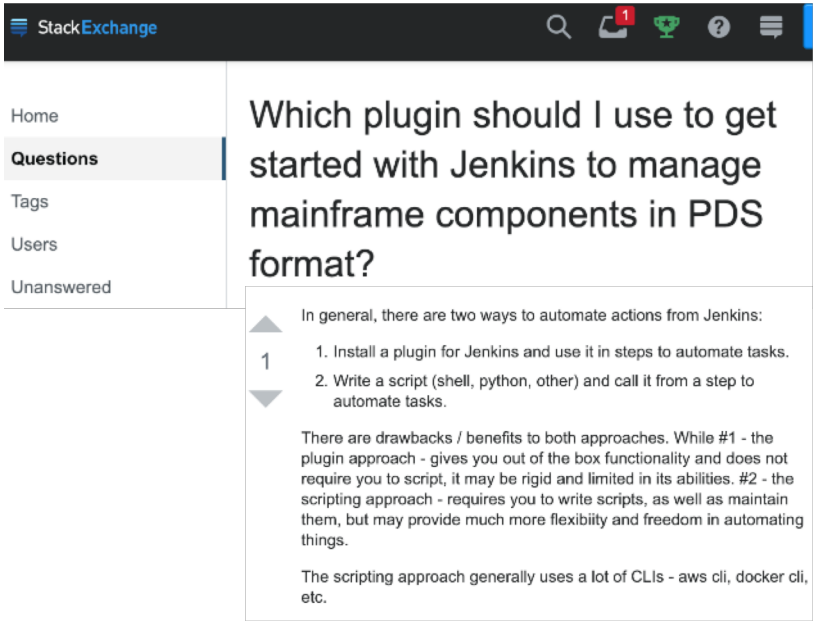
Add your favorite tool

Zowe CLI

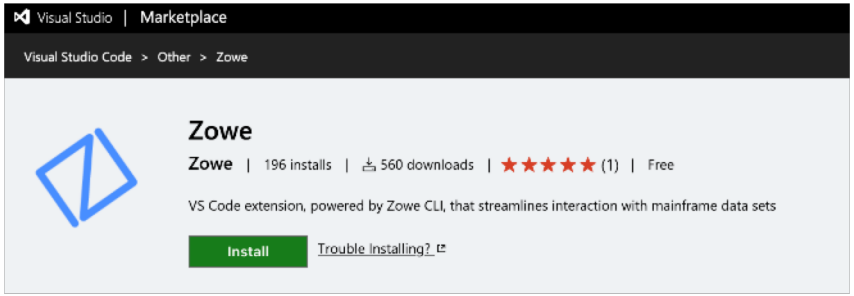

python
Apache Maven
Bitbucket
Ruby
Jenkins
Bamboo
node
Gradle
Gulp
JUnit 5
MOCHA
Chai Assertion Library
Visual Studio
IntelliJ IDEA
Sublime Text
GitHub Enterprise
ATOM
sonarqube
urban{code}
CAST
Add your favorite tool
Ravi
(DevOps)
Michelle
(App Dev)
Zowe CLI
Core
Plugins
AWS CLI, IBM Cloud CLI...
Cloud
Mainframe
API Mediation Layer
IBM DB2
IBM CICS
zOSMF
Service 1
Service 2
TSO
Console
Datasets
Jobs
Tyler
(System Administrator)

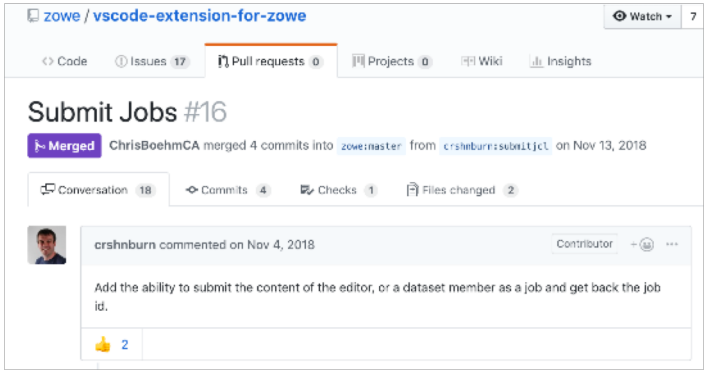
Community

- How do I call mainframe from Jenkins?



- Build IDE extensions!





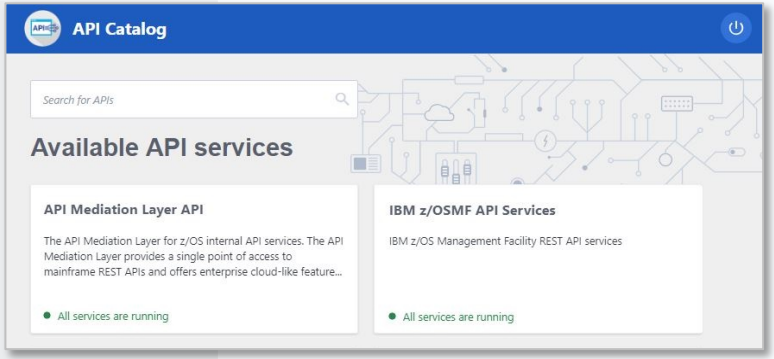
Zowe API Mediation Layer – Gateway to mainframe APIs

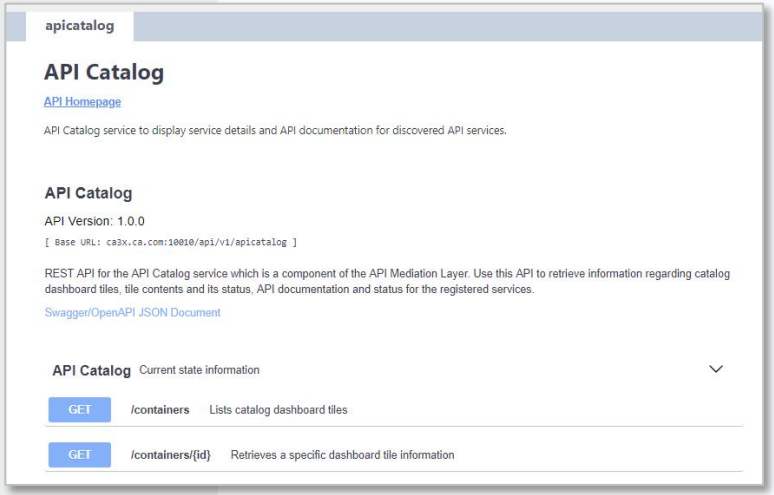
- Enables a single point of access to mainframe APIs with high-availability, scalability, dynamic API discovery, consistent security, “one-time” sign-on experience and unified standard API documentation (OpenAPI / Swagger)

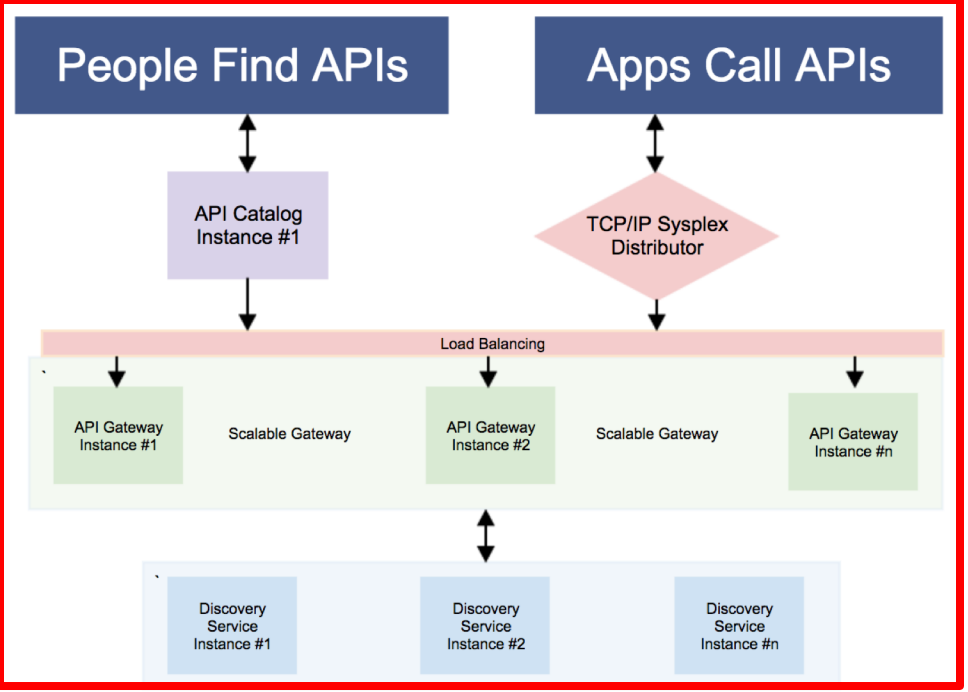
  - ***API Catalog***
    UI Catalog of available APIs with their Swagger doc and service status

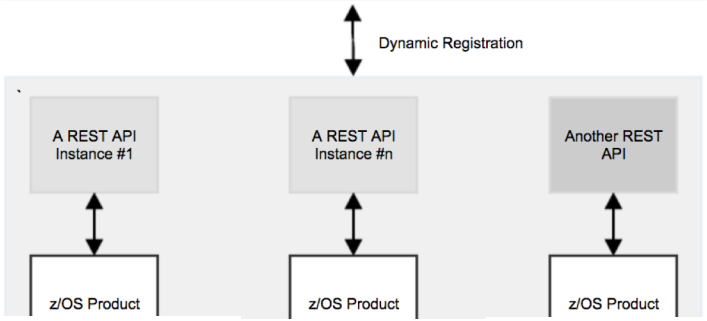
  - ***Gateway***
    Single secure point of entry to an ecosystem of API services. Hides complexity. Highly available. Based on Netflix Zuul.

  - ***Discovery Service***
    Discover APIs across many applications. Repository of active API services. Based on Netflix Eureka.







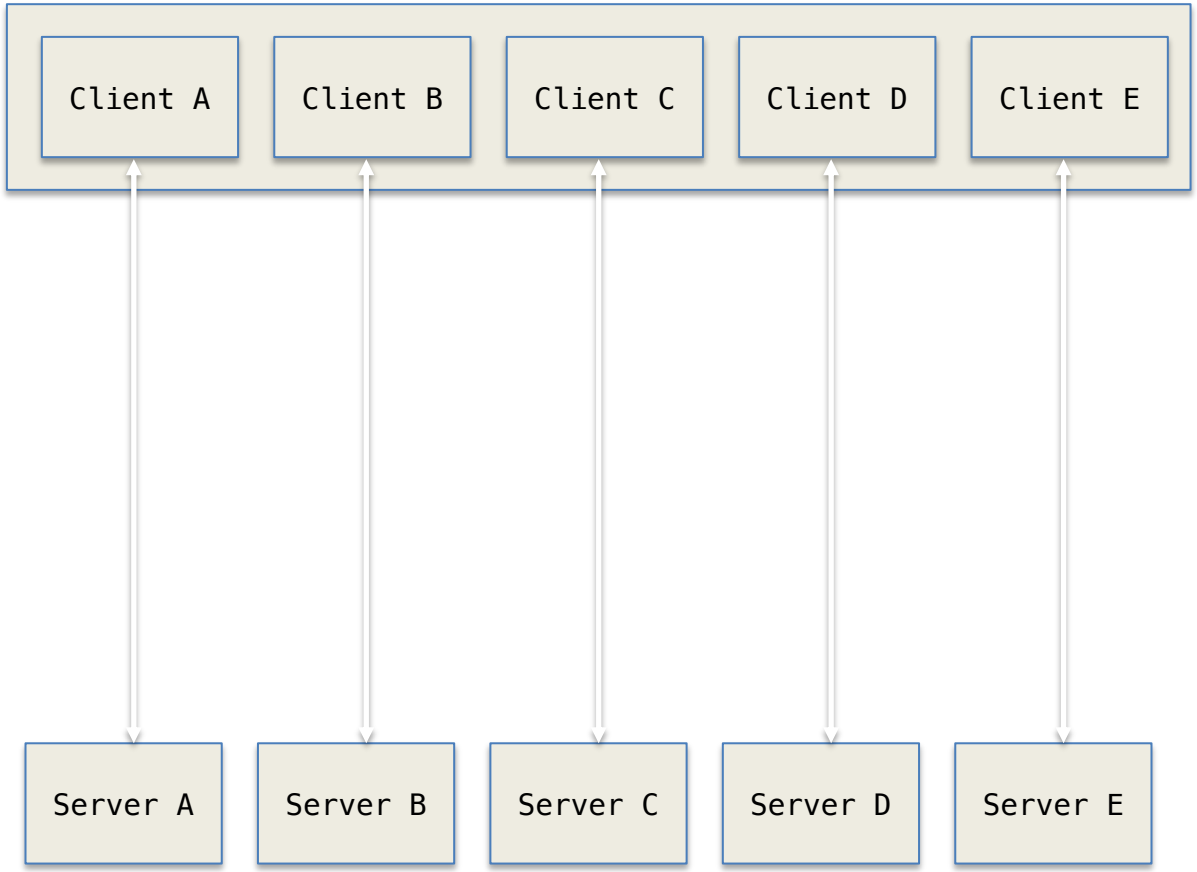


z/OS Connect z/OSMF Jax-RS App

API Layer Components*

- **API Catalog**
  UI Catalog of available APIs with their Swagger doc and service status
- **API Gateway**
  Single point of entry to an ecosystem of microservices. Hides complexity. Highly available. Based on Netflix Zuul.
- **Discovery Service**
  Discover APIs across many applications. Repository of active services. Based on Netflix Eureka.
- **z/OSMF API**
  Authenticate Zowe users with mainframe credentials

** Separate microservices, might be running as separate address spaces*



Problems

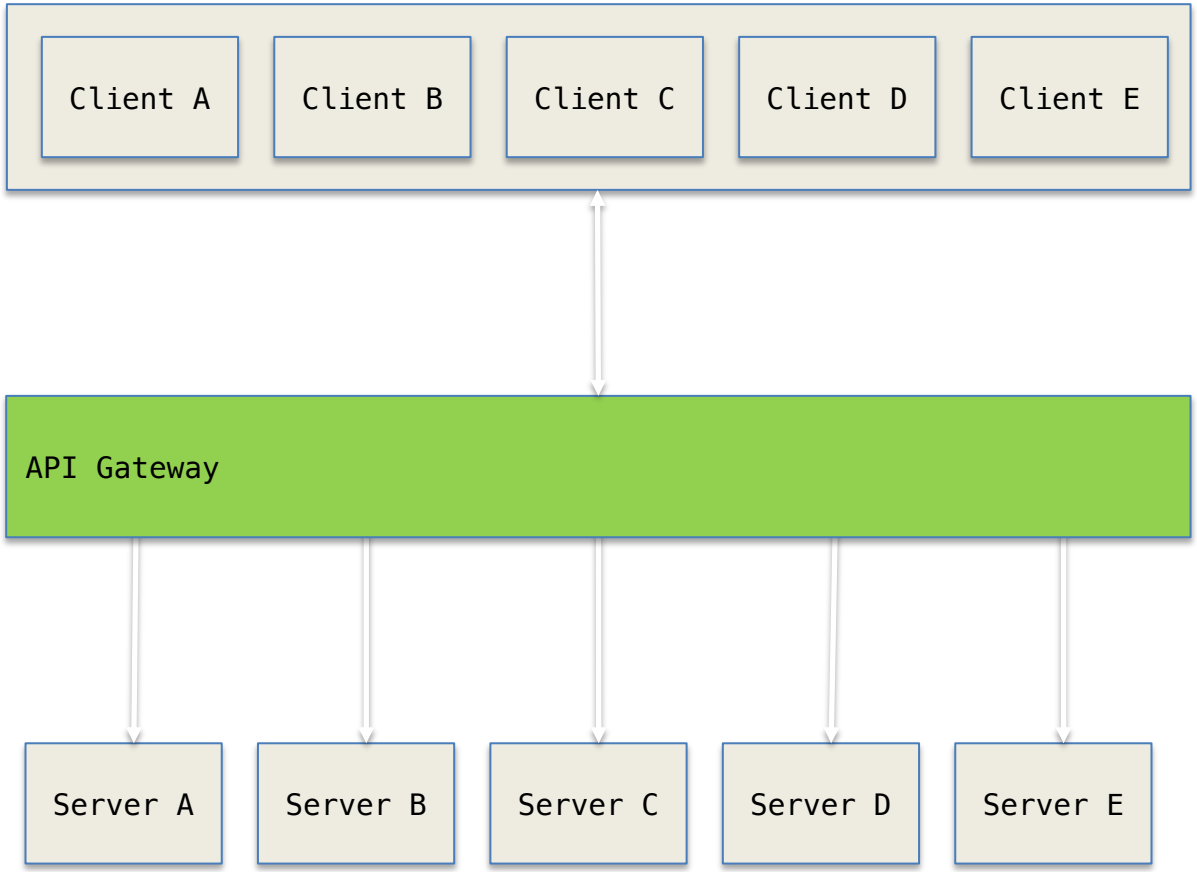
Multiple Sign On

n Endpoint Configuration

Heteregenous certificates

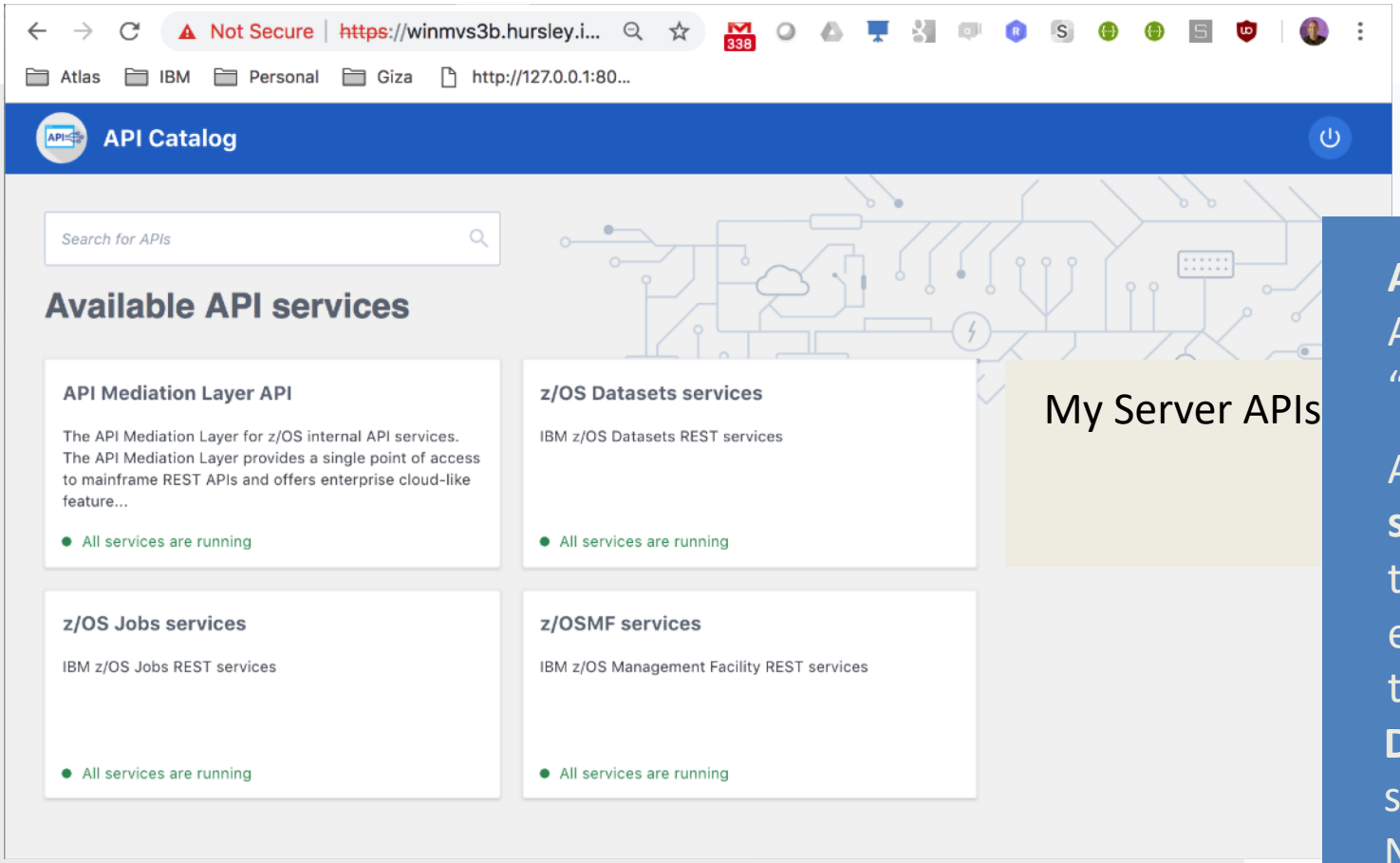
Cross Origin Request

...



API Gateway

- Netflix Zuul/Eureaka base
- Single Sign On (SSO)
  - JSON Web Token
- Reverse proxy endpoint
- Swagger open API Catalog
- Single client certificate
- Gateway<-> Server
  - Static registration
  - Dynamic Discovery



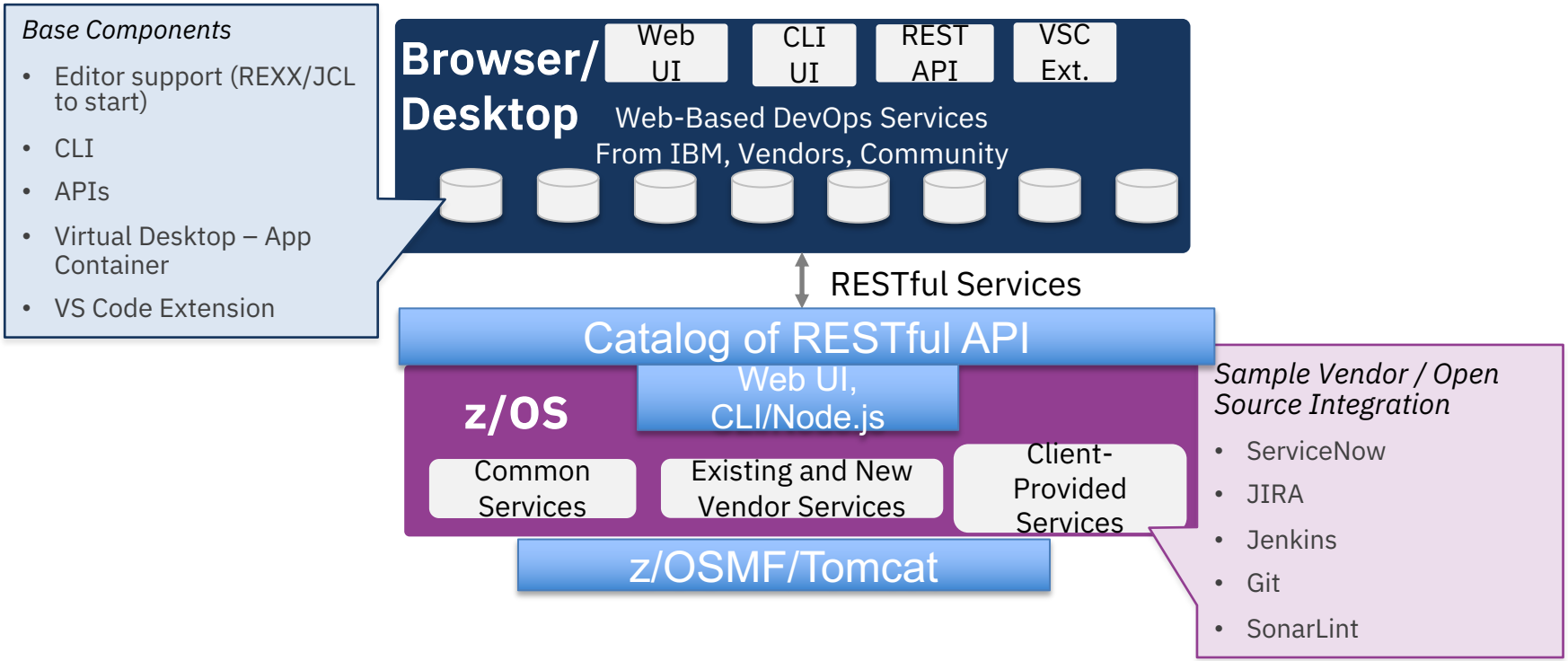
My Server APIs

API Catalog lists API servers on its "Southbound edge"

API servers can be **statically** defined through .yaml files or else REST API calls to the gateway

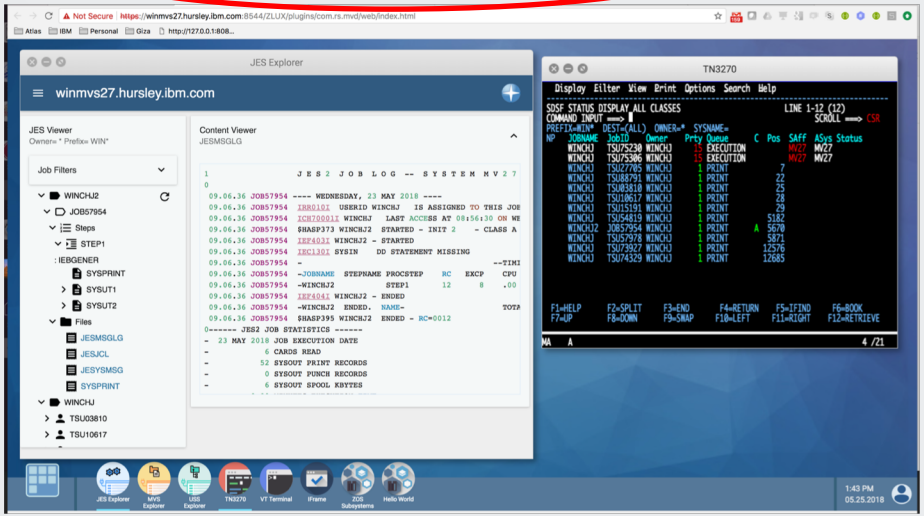
Dynamic discovery service based on Netflix Eureka framework

Zowe High Level Architecture

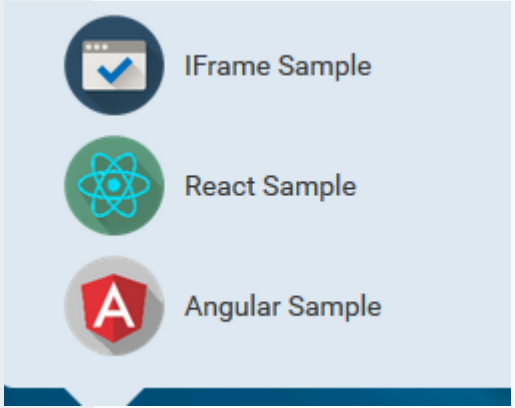


Where is Zowe Extensible?

Browser-based Web Desktop

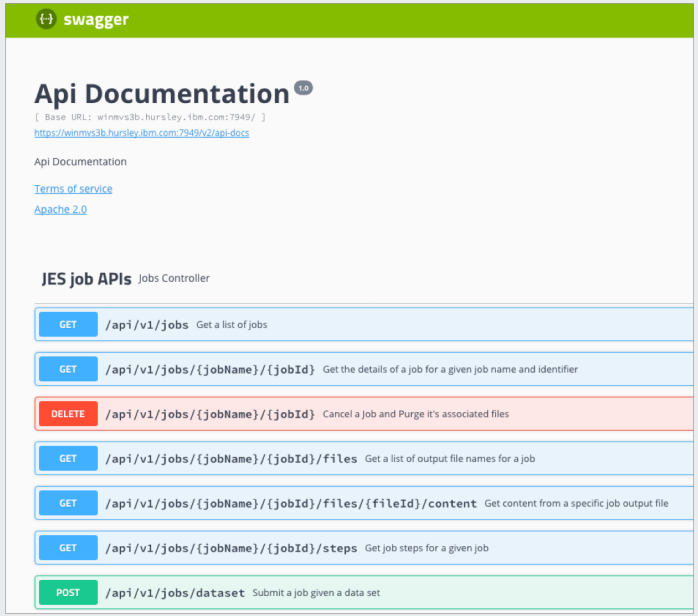


- z/OS Native Web UI for applications
- Launch in context (i.e., right mouse click 3270 to web app)
- App to app communication
- Exploit graphic widgets planned for inclusion



Where is Zowe Extensible?

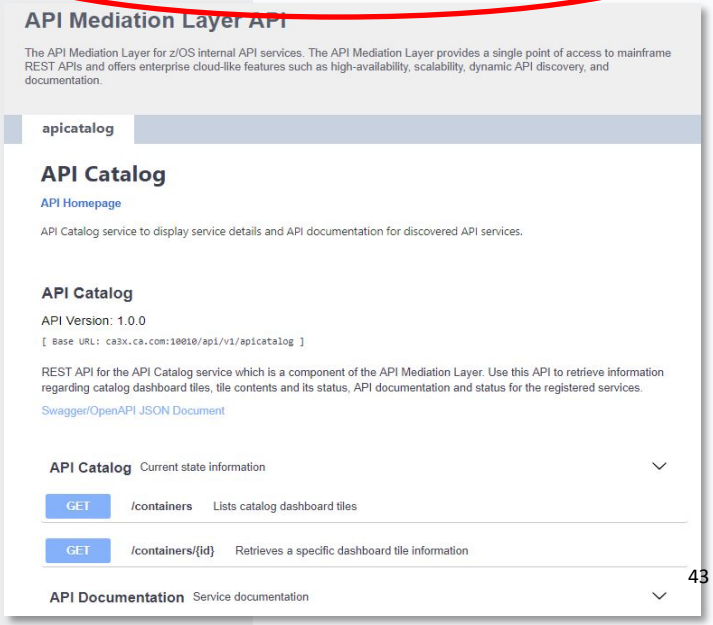
- REST API enable your products
  - REST API for product controls/admin
  - Sharing of information



Swagger-defined z/OS REST APIs

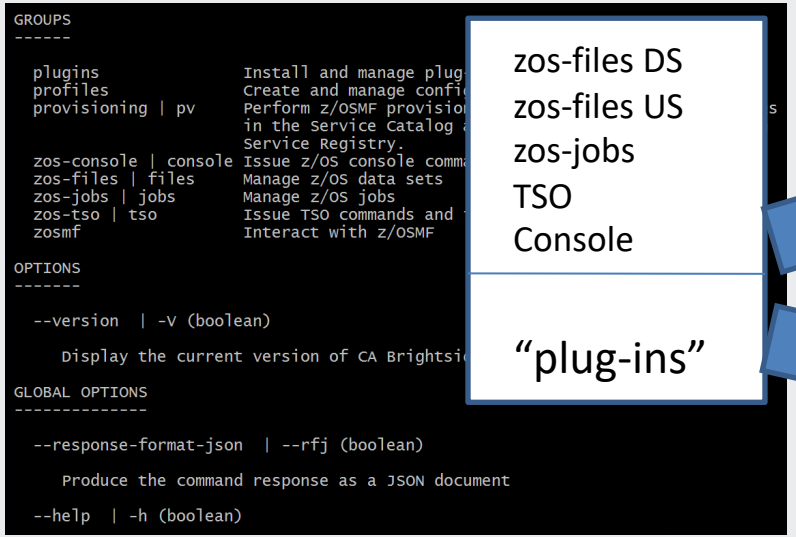
- Opt in to API Mediation
- Participate in Single Sign On, High Availability and Status tracking capabilities

API Mediation Layer
(API Catalog, Discovery Service, Gateway)



Where is Zowe Extensible?

Node.js- based CLI



zos-files DS
zos-files US
zos-jobs
TSO
Console

“plug-ins”

Out of box commands

Custom Extensions

z/OSMF

REST APIs
TSO, Console
JES, MVS. USS

Your application, product, tool, …

Commitment to Core Infrastructure Initiative (CII) & Badge Program

- “CII is a collaborative, pre-emptive program and approach for strengthening cyber security that is widely supported by industry leaders”
- “CII Badge Program is a self-certify, declaration of industry best practices and conformances in driving secure software development and governance”

Notable CII “backers”

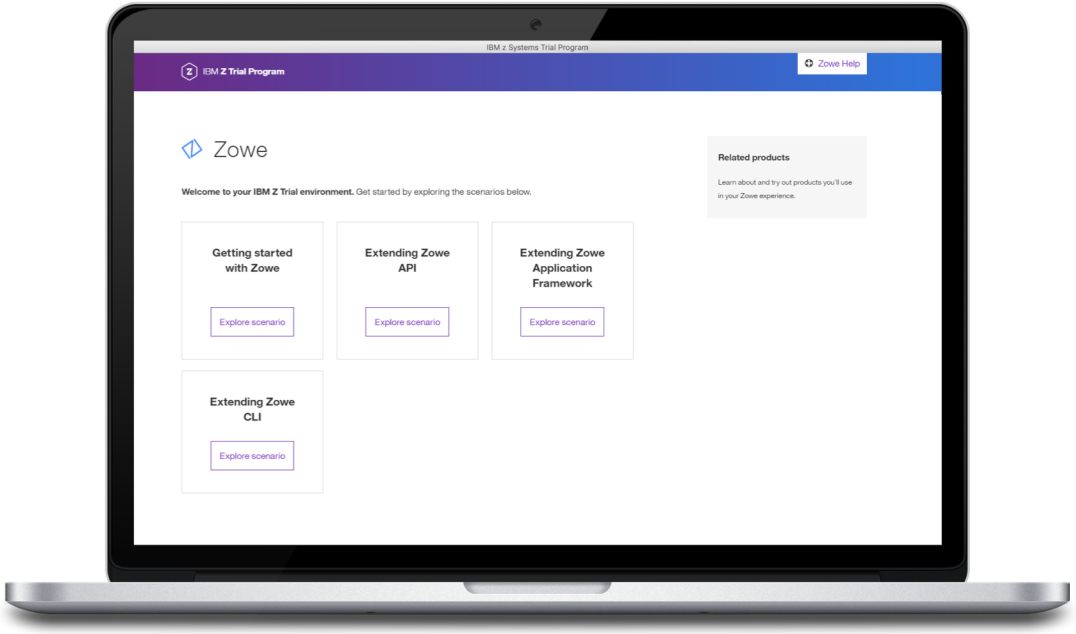
Source: https://www.coreinfrastructure.org

Notable Badge “earners”

Source: https://bestpractices.coreinfrastructure.org

Zowe Trial

- Try the Zowe capabilities at zero cost, and with no installation required.
- Pre-configured, remote desktop environment
- Your trial environment comes loaded with tutorials that show you how to:
  - Get started with Zowe
  - Create and extend Zowe with new APIs
  - Create and extend Zowe Desktop with new web application
  - Create and extend Zowe CLI with new CLI commands



IBM Z software trials:
https://www.ibm.com/it-infrastructure/z/resources/trial

The Zowe open community

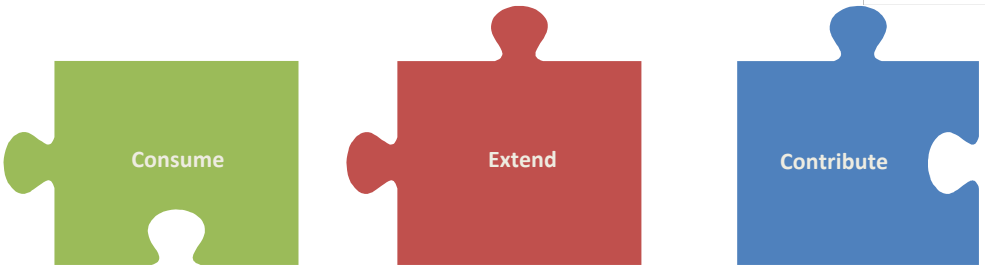
Check out https://zowe.org/about-us/

A foundational principle of this new project is *meritocracy*. The more that somebody contributes, the more responsibility they will earn. A pattern of quality contribution to a project may lead to an invitation to join the project as a committer.

Leadership roles in the Project are also merit-based and earned by peer acclaim. Merit must be demonstrated in publicly-accessible forums. Committers and project leads are added to a project via an election.

Getting Involved

- We are building more than just technology, we are building a **community**



Learn	Consume	Extend	Contribute
▪ Visit the Open Mainframe Project ▪ Visit Zowe.org ▪ Connect with us on Slack or via email list	▪ Zowe Github ▪ Download Zowe ▪ Review documentation ▪ Troubleshooting ▪ Reach out to us on Slack or via email list	▪ Review the extenders guide ▪ Zowe Tutorials and Samples	▪ Provide feedback, problems or recommendations to us on Slack or via email list ▪ Submit Git Issues ▪ Review the community backlog and contribute code ▪ Earn your committer status through meritocracy

Getting Started with ...

Zowe

Open. Simple. Familiar.

- Project Community site
  - https://zowe.org
- Access to Beta Download
  - https://zowe.org/download
- Review Zowe squads, missions and activities
  - https://zowe.org/contribute/
- Code Guidelines
  - https://zowe.org/code-guidelines/
- Project Governance
  - https://zowe.org/about-us/
- GitHub
  - https://github.com/zowe
- Project Documentation (includes user and install guides)
  - https://zowe.github.io/docs-site/
- Developer Tutorials
  - https://zowe.github.io/docs-site/guides/intro.html
  - https://developer.ibm.com/tutorials/zowe-step-by-step-tutorial/

Community Slack Channels

Community Mailing Lists

Community Calendar

Community Meeting Minutes

Get involved in the Zowe community

Join Open Source Community @
https://www.openmainframeproject.org/projects/zowe

Participate in and contribute to the Zowe developer community at zowe.org

Learn how your organization can become a steward and supporter of this project with Open Mainframe Project membership at openmainframeproject.org/about/join

Questions?

We are building more than just technology, we are building a **community**

zowe.org