Technical Deep Dive

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Outline

- Overall Architecture
- Technologies Used
- Components and Features
- Developer Resources
- Conclusion
Acumos Architecture

Acumos Platform Federation
- Acumos Marketplace
- Acumos Company Y
- Acumos Co. Y-1

Acumos Platform
- Acumos Company X

Acumos Architecture Diagram:
- **E1 - Toolkit Onboard**
  - Modeler
  - User
  - Operator
  - External API Gateway
  - E2 - Web APIs
  - E3 - OA&M APIs
  - E4 - Admin APIs
  - E5 - Federation APIs

- **Internal API Services**
  - Pre-training/Testing Data
  - Onboarding
    - CLI Onboarding
    - Web Onboarding
    - Authentication
    - Converter/Dockerizer
    - Notification
  - Validation
    - Validation Toolkits
    - Notification/Alert
    - Policy Enforcement*
    - Simulator/Tester*
    - Validation Dashboard
  - Design Studio
    - Model Selection
    - Data Collection
    - Data Transformation
    - Validate Solution
    - Design Canvas (drag & drop)
  - Portal/MarketPlace
    - Private/Local/Public Catalogs
    - Publishing Model
    - Importing/Exporting Model
    - Model Search/Review/Rating
  - OA&M
    - Admin Dashboard
    - User Management
    - Security Management
    - Monitoring
    - Federation
  - Model Repository
  - Catalogs Model Artifacts Test Data
  - TOSCA Topology
  - System Component Data Model & Schema Policy & Rules
  - Portal
  - User Profile
  - Performance
  - Configuration
  - System Logs
  - ML Tool Library
  - TensorFlow
  - H2O
  - RCloud
  - Java

- **External API Gateway**
  - Design Canvas (drag & drop)
  - Federation APIs
  - Onboarding
    - CLI Onboarding
    - Web Onboarding
    - Authentication
    - Converter/Dockerizer
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- **Target Deployment Environments (including external data sources for training and execution)** ...

* TBD (R2)
Technologies

TensorFlow, scikit-learn, Keras, OpenCV

Backend
- Spring-Boot to implement REST endpoints
- Swagger to document endpoints
- JUnit to automate tests
- Docker to package code into deployable image
- MariaDB Database

UI
- Angular JS
- Bootstrap - Open source toolkit for developing with HTML, CSS, and JS

Hippo Cms

Kibana Visualize Elasticsearch data and navigate the Elastic Stack

Openstack and Microsoft Azure for Deployment of Solutions
Acumos Portal

Portal UI
• Provides UI dashboard
• Implemented in Angular JS with Spring-Boot
• Published as Docker image in Nexus registry

Portal Backend
• Provides REST endpoints and Swagger documentation
• Implemented in Java with Spring-Boot
• Published as Docker image in Nexus registry
• Published as Jar in Maven repository

Hippo-CMS
• Provide Content Management System to store Images and Icons of Portal Market.
Acumos Python Client

Allows modelers to use whichever Python tools they’d like to build their Acumos model

- TensorFlow, scikit-learn, Keras, OpenCV, ...

Minimizes the barrier to entry for on-boarding by abstracting software engineering concerns such as:

- Interfacing with Acumos runtime APIs
- Docker image creation
- Schemas related to model metadata, interface, and data format definitions
Design Studio
Design Studio High Level Design

- **Basic Functionality:** Drag Drop the models
  - Interconnect them to create composite solution
  - View the individual model properties.
- ** CRUD operation on Composite Solutions**
- **Search matching Models**
- **Validate Composite Solution**
- **Generic Data Mapper**

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![Diagram of Design Studio High Level Design]

- **Composition Engine**
  - Application Properties
- **Controller**
- **Service**
- **Utils**

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**Other Acumos modules dependency**

- NexusClient
- CDS Client

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**Market Place Front End Engine**

- **Web Browser**
- **Design Studio UI**

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**Nexus**

- **Docker Registry**

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**Portal**

- **Client Library**
- **OnBoarding**
- **DesignStudio**
- **Deployment**
Deploy Model from Portal
Model Deployment Architecture

Deploy Single Or Composite Data Model

Portal Market

Model Deployer

ML Models Docker Image
Model Connector Docker Image
Model Blue Print JSON
ML Model Docker Container
ML Model Docker Container
ML Model Docker Container

VM

Provide BluePrint JSON
Provide IP and Port information of all Model containers
Instantiate Container
Instantiate Model Containers
Get IP + Port of Containers

Portal Client Library OnBoarding DesignStudio Deployment
Download Artifacts of the Model
Developer Resources

- Acumos wiki - https://wiki.acumos.org
- Gerrit code repository - https://gerrit.acumos.org
- Jenkins jobs - https://jenkins.acumos.org
- Jira issues - https://jira.acumos.org

Wiki references handy for developer:

- Developer wiki - https://wiki.acumos.org/display/AC/Developer+Wiki
- CI/CD - https://wiki.acumos.org/display/AC/Acumos+Developer%27s+Guide+to+CI-CD+Resources+and+Processes
Proposed Projects and Repos

- Import
- Onboarding
- Catalog
- Portal
- Design Studio
- Deployment
- Federation
- Training
- License Manager
- Data Model
- Documentation
- OA&M
- Testing
- Security
Sample Endpoint Documentation in Swagger

Acumos Common Data Service REST API
Provides create, retrieve, update and delete (CRUD) services for Acumos data including solutions, artifacts and users. All service endpoints require basic HTTP authentication.

Created by Acumos Data Model Team
See more at [https://acumos.org/to-be-determined](https://acumos.org/to-be-determined)
Contact the developer

Apache 2.0

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[BASE URL: /ccds, API VERSION: 1.1.2.0-02]
Welcome to Acumos Documentation!

- Releases
  - Summary
  - Major Releases
- Acumos Developer
  - Architecture
  - Setting Up Acumos
  - Development Guides
  - Documenting Acumos
- Acumos User
  - Acumos Portal MarketPlace Users Guide
  - Acumos Onboarding Users Guide
  - Acumos Design Studio Composition Engine User Guide
  - Acumos Test Automation User Guide

Indices and Tables

- Search Page
Today’s talk takeaway

- Distributed AI Marketplace Architecture
- Access to ML models which is easy to apply by the business software development teams
- Broad range of customer use cases can take advantage
- Opens up for wide range of automation which directly result in companywide cost savings at large numbers