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Conversations with OLI Experts Series

Episode 11:

Technical architecture and capabilities of the new OLI Cloud Platform

Live Webinar **July 13th , 2021**

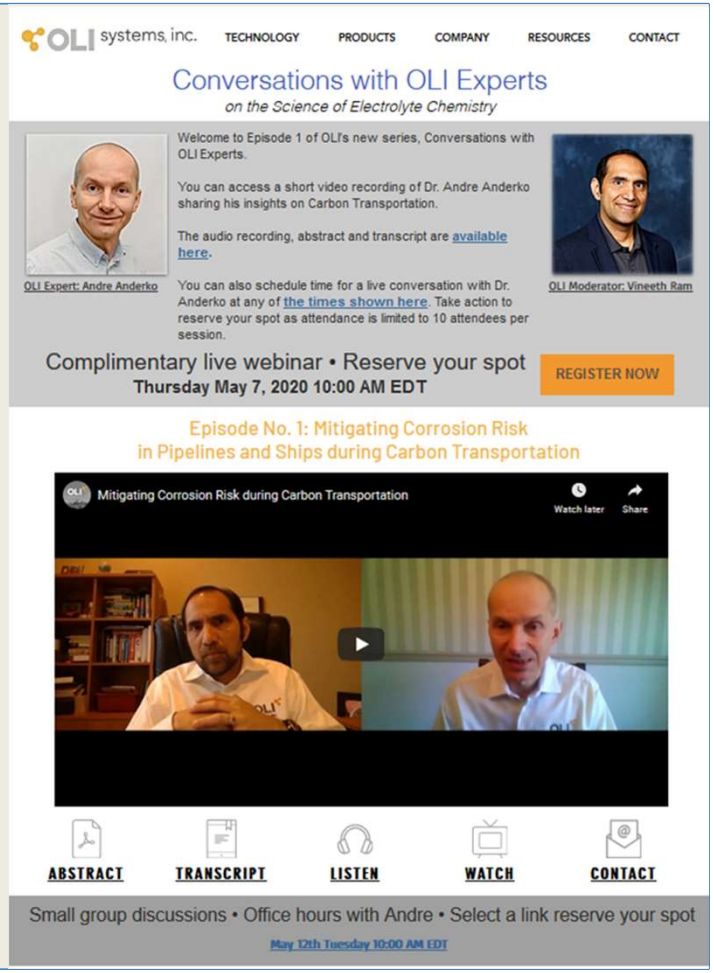
Conversations with OLI Experts Digital Series

- Insights from OLI Technology Experts
- Monthly Episodes
- Focus on the science of electrolytes
- On-demand digital content assets
- Live Webinar
- Webinar available on-demand post event

Conversations with OLI Experts

Multiple digital assets in every episode

- 10-minute video podcast
  - https://www.olisystems.com/podcasts
- Transcript of recording
- Audio recording
- Abstract and link to technical paper
- Registration for Live Webinar
- 45-minute webinars
  - https://www.olisystems.com/experts



Conversations with OLI Experts Episodes

Broad range of electrolyte chemistry applications

OLI systems, inc.

Episode 1: Corrosion in pipelines during CO_2 Transportation

Episode 2: Lithium mining: maximizing yields and lowering costs

Episode 3: REE Mining: developing efficient extraction and purification processes

Episode 4: Modeling corrosion behavior of Corrosion Resistant Alloys (CRAs)

Episode 5: Electrolyte chemistry analysis capabilities in industrial process simulators

Episode 6: Thermodynamic foundations of corrosion

Episode 7: The science of adsorption and ion exchange in industrial water treatment

Episode 8: HF Alkylation in Refining: Thermodynamics and process simulation to mitigate corrosion

Episode 9: Electrolytes in practice: thermodynamic modeling of aqueous systems

Episode 10: The New OLI Cloud Platform

Episode 11: Technical architecture and capabilities of the new OLI Cloud Platform

Conversations with OLI Experts Episode 11: Webinar Speaker

Technical architecture and capabilities of the new OLI Cloud Platform

Arjun Ramesh

Product Manager

OLI Systems, Inc.

Arjun is a Product Manager working to constantly improve the customer experience of OLI Products. He derives from his previous experience as an Engine developer to help shape OLI's digital transformation initiatives by architecting their next generation web-based solutions and Application Programming Interfaces (APIs), whilst elevating the developer experience. His primary role is to create innovative solutions around OLI's core offerings.

Arjun is a core contributor to the design, architecture and development of OLI software's unified computation layer, which combines process, thermodynamics, corrosion and scale prediction to deliver a seamless user experience and is used extensively in both the desktop and cloud platforms. He leads the efforts to deliver OLI's cloud offerings by working with an interdisciplinary team of web and computational developers. Arjun has also contributed to developing OLI's optimizer tool by creating an innovative evaluation pipeline using the Lua programming language. Other activities include improving the efficiency of OLI's equilibrium compute kernel, introducing modern programming languages and paradigm to the software team, and improving software interfaces.

Arjun's areas of expertise include Chemical engineering, Thermodynamics, Mathematical modeling and simulation, Cloud computing and API(s), Scientific software development. Arjun has a M.S, Chemical Engineering degree from Carnegie Mellon University and a B.Tech, Chemical Engineering with minor in Industrial Automation, VIT University, India.

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Technical architecture and capabilities of the new OLI Cloud Platform

Arjun Ramesh

OLI Systems, Inc.

July 13th, 2021

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Digital Transformation Platform Architecture

OLI API(s) and Application Builder

Agenda

- OLI Cloud Platform
- OLI Cloud Platform Vs OLI Windows Desktop Platform
- OLI API(s)
- OLI Application Builder
- Demo’s
- High Level Cloud architecture
- Questions ?

Introducing the OLI Cloud API Backend Platform and Cloud App Builder Solution

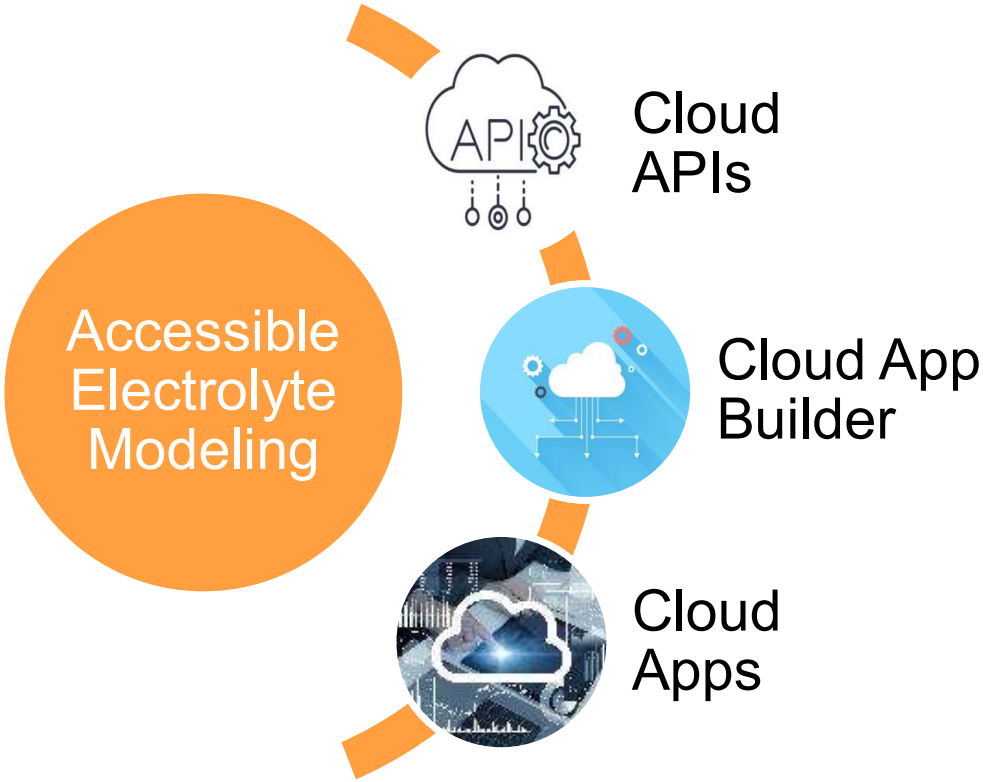
New Tools to Drive Digital Transformation

OLI Platform V11
rigorous chemistry insights and software innovations enhance **sustainability, reliability, and efficiency**

Tools to deliver value-add programs and solutions

Accelerating innovation for digital transformation

OLI systems, inc.



Enhance environmental sustainability and compliance

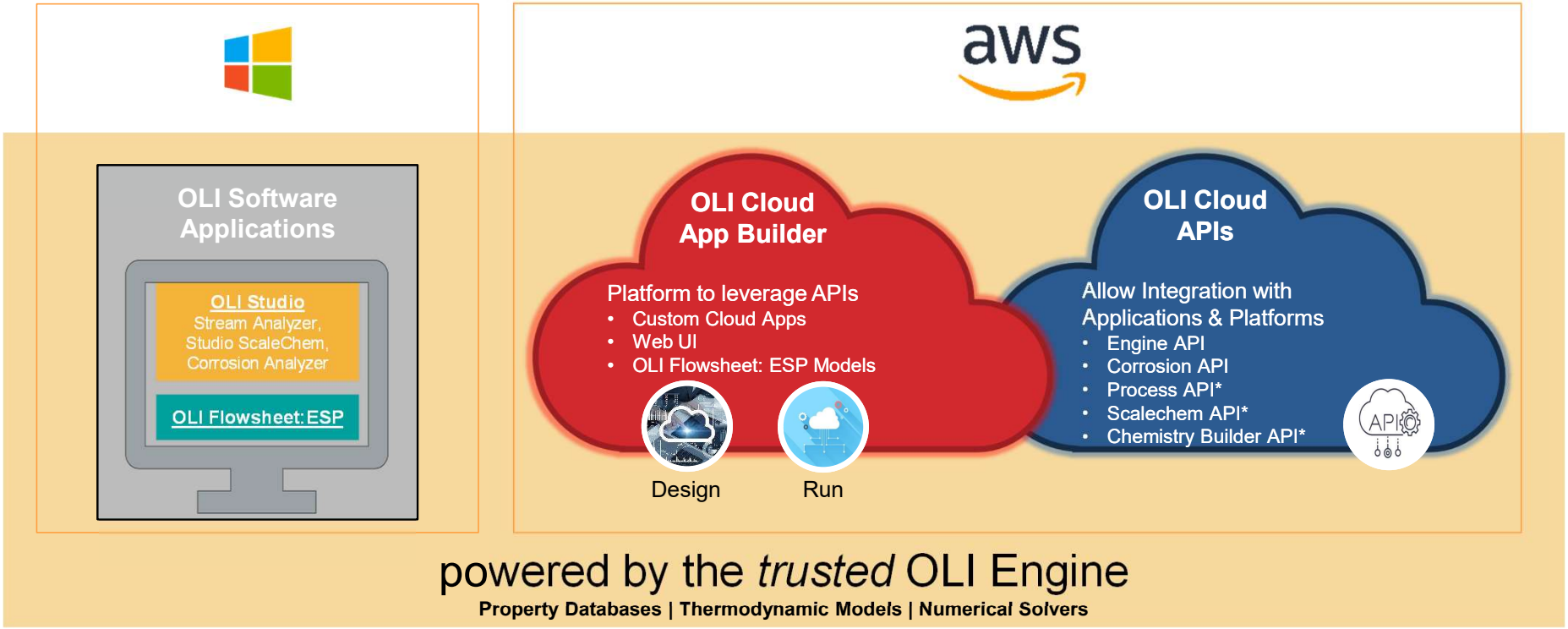
Increase reliability in upstream oil & gas

Mitigate risk in downstream oil & gas

Accelerate yields in lithium, rare earth elements (REE) mining and recycling

V11 Platform Extends OLI trusted Functionality to the Cloud

Cloud APIs and Cloud Apps for ubiquitous access to simple applications



*Available in 1H 2022

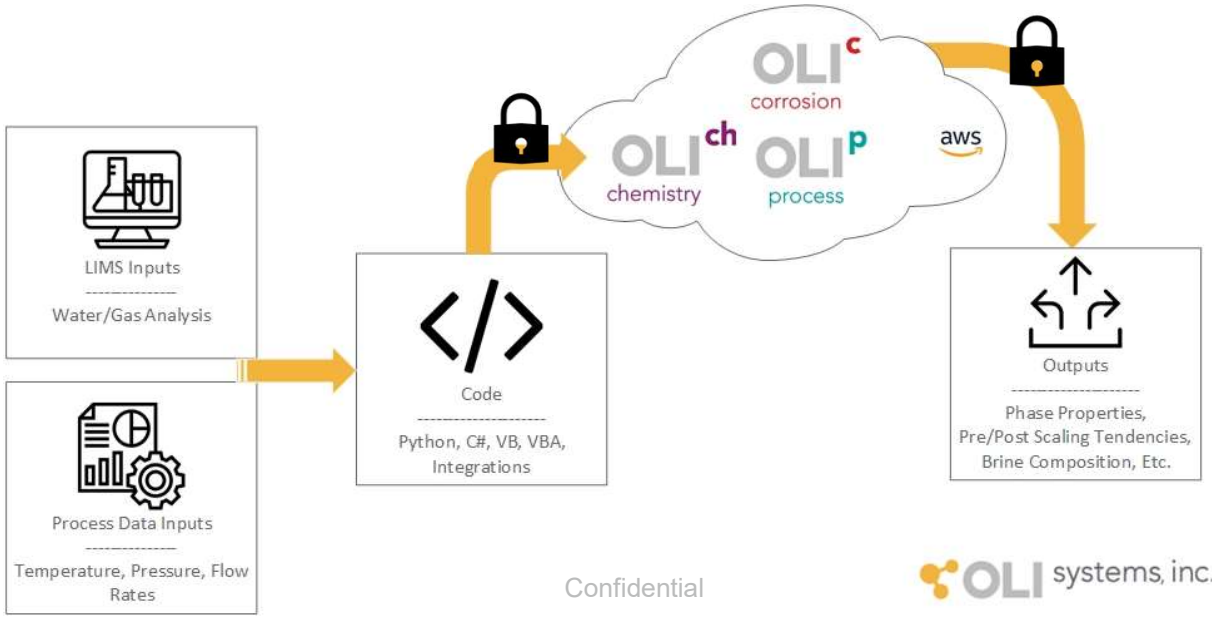
Democratization of electrolyte modeling with OLI Cloud Platform

Full accessibility to Simulation results

Target Audience		Desktop	OLI Cloud Apps	OLI Cloud APIs
User Type / Persona	Electrolyte Chemistry Experts (R&D) - Production Chemists, Geologists, Thermodynamics Experts	✓		
	Engineers and Scientists (R&D) - Corrosion, Flow Assurance, Process Simulation, Consultants	✓	✓	
	Plant Engineers		✓	
	Field Operators and Operations Supervisors		✓	
Application / Platform	Custom Software Applications (Custom Programming, Web Interface)			✓
	Commercial Software Applications (KBC, OSIsoft, Seeq, Power BI, Honeywell, aspentech, AVEVA, Excel)	✓		✓
	Commercial software platforms/ecosystems (C3.ai, DELFI, aws, Azure)			✓
	Commercial Cloud Services (IaaS, Paas) (aws, Azure)			✓

OLI Cloud API for Automation

- Uses the *trusted* OLI Engine to enhance applications and automate processes
- API access requires coding to produce outputs
- Secure transactions to the cloud
- [Welcome to the OLI API documentation - OLI API (olisystems.com)]

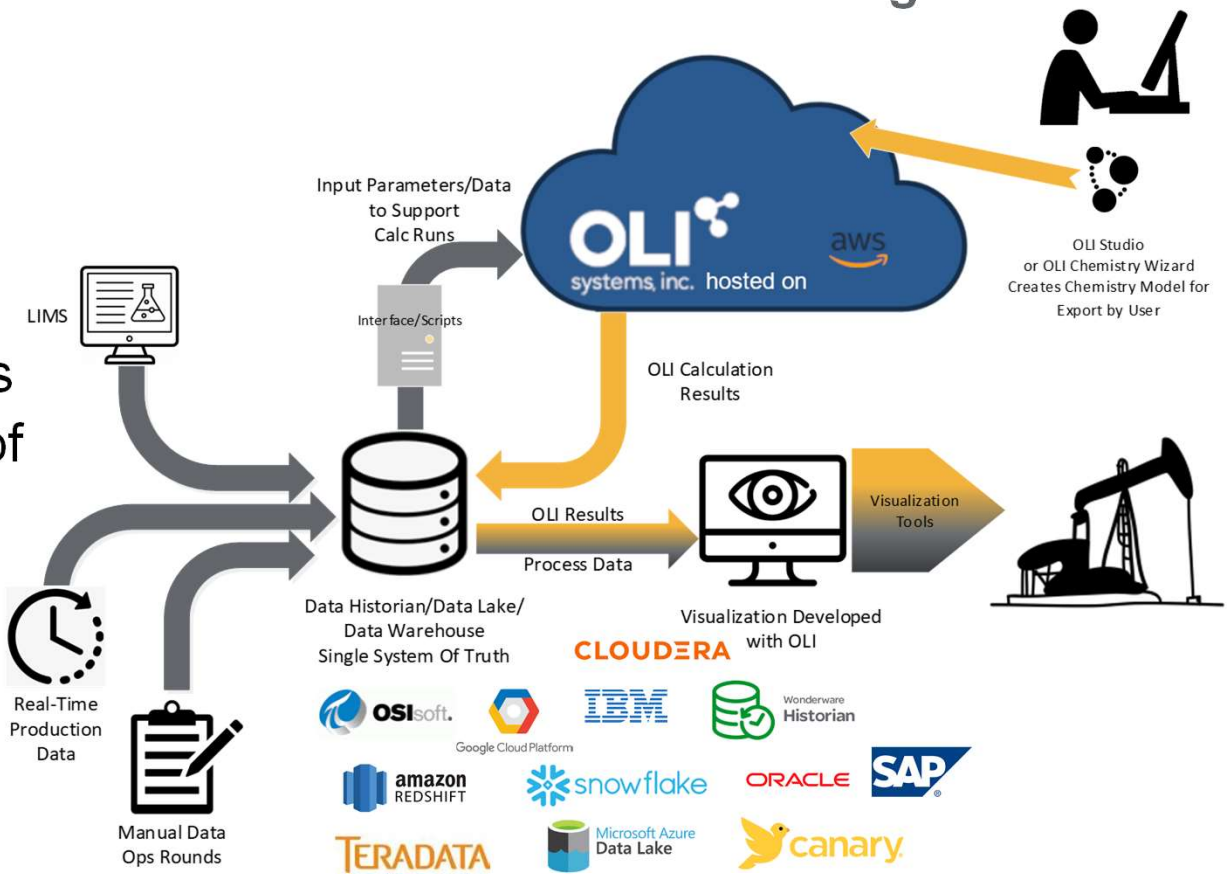


Cloud API Use with Central Data Repository

Features

- Sharing calculation results across enterprise
- Larger quantity of results completed without manual interaction each run
- Long term storage of results
- Use of results in multitude of solutions
- OLI Value-Add Services
  - Data Integration
  - OLI Engine Cloud API
  - Visualization Development

Interaction with API via Integration



OLI API(s): Introduction

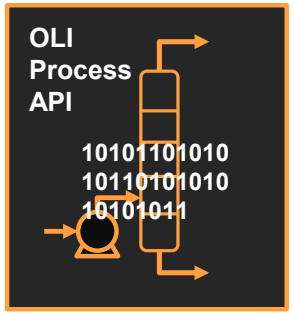
- Exposes OLI's core technology as easy to use Web API(s) accessible from anywhere with an internet connection. Uses the same trusted engine powering OLI's Desktop products

- Forms the building blocks of OLI that can be combined to build complex services and are fully managed by OLI

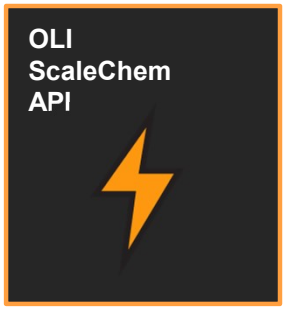
Released

Perform Isothermal/Isobaric/ Isenthalpic/water analysis calculations for a given stream composition and state

Calculate corrosion rates given stream composition, alloy and conditions



Run whole flowsheets and return final state for all streams and blocks



Run OLI ScaleChem specific calculations like Mixers, Saturators etc.

OLI API(s): why JSON (JavaSrcipt Object Notation)?

- JSON is the native format of the web for exchanging data between clients and servers
- Popularized by the most relevant language of the web i.e., JavaScript, Python
- Although started in the web world, JSON is ubiquitous and used to store/represent data even in non-web contexts
- Is both human as well as machine readable
- Reduces development time for integration with third party primarily in the web context

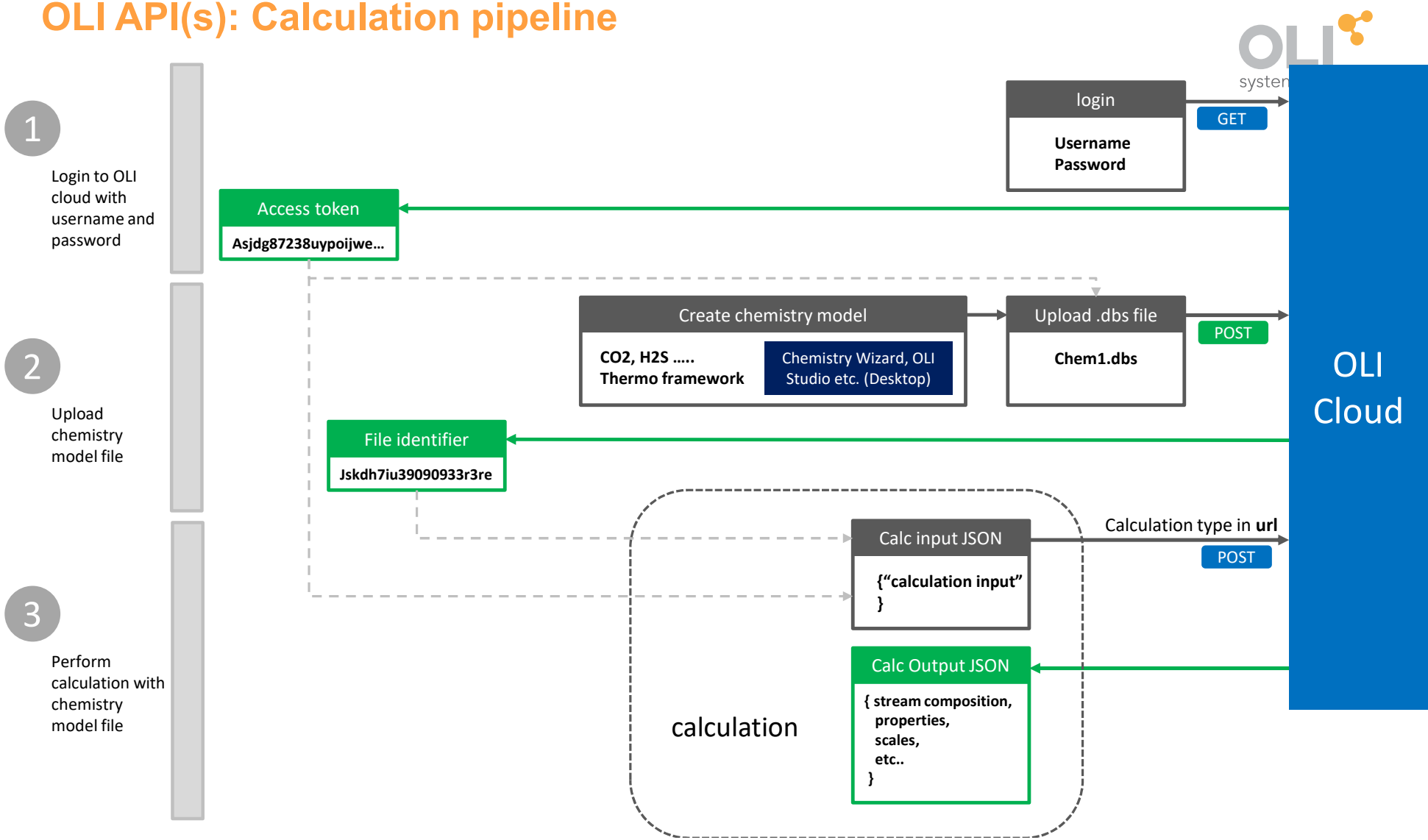
```
{
    “temperature”: {
        “value”: 298.0,
        “unit”: “K”
        },
    “pressure”: {
        “value”: 1.0,
        “unit”: “atm”
        },
    “inflows”: {
        “H2O”: 10.0,
        “NACL”: 1.3
        }
}
```

OLI API(s): Basic components

- **User login:** The credentials issued to the user for using OLI Cloud services
- **Chemistry Model file:** A text file that contains all of the chemistry data. This file has the extension of .dbs
- **Input JSON:** JSON that represents the calculation input
- **Output JSON:** JSON that represents the calculation output

Developer docs: [Welcome to the OLI API documentation - OLI API (olisystems.com)]

OLI API(s): Calculation pipeline



OLI API(s): Advantages & Applications

Advantages

- All services are fully maintained by OLI, no installation of OLI components needs to be done
- Build complex services by stitching together different API(s)
- Get latest updates as they become available
- As your usage of OLI grows, easily increase compute power to grow with you

Applications

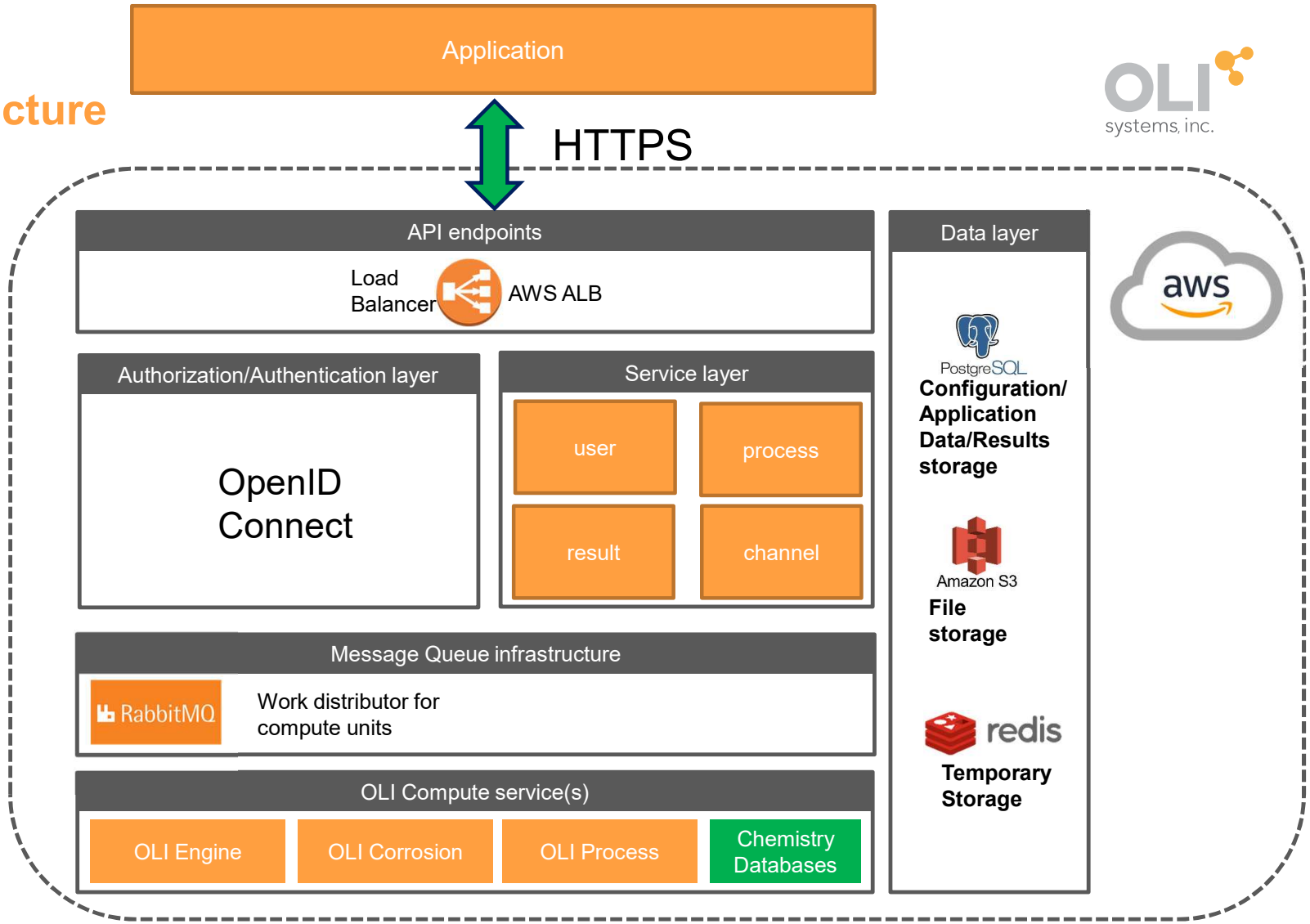
- Build custom applications that scale and are tailored to your requirement
- Integrate OLI into your automation strategy for analytics, insight generation and ultimately decision making

OLI API(s): Demo with Postman

- **Isothermal calculation**:
  Run a basic flash calculation at constant temperature and pressure and return the equilibrium output

- **Corrosion rates calculation:**
  Predict the corrosion rates given a fluid composition, alloy and state

High Level Cloud Architecture



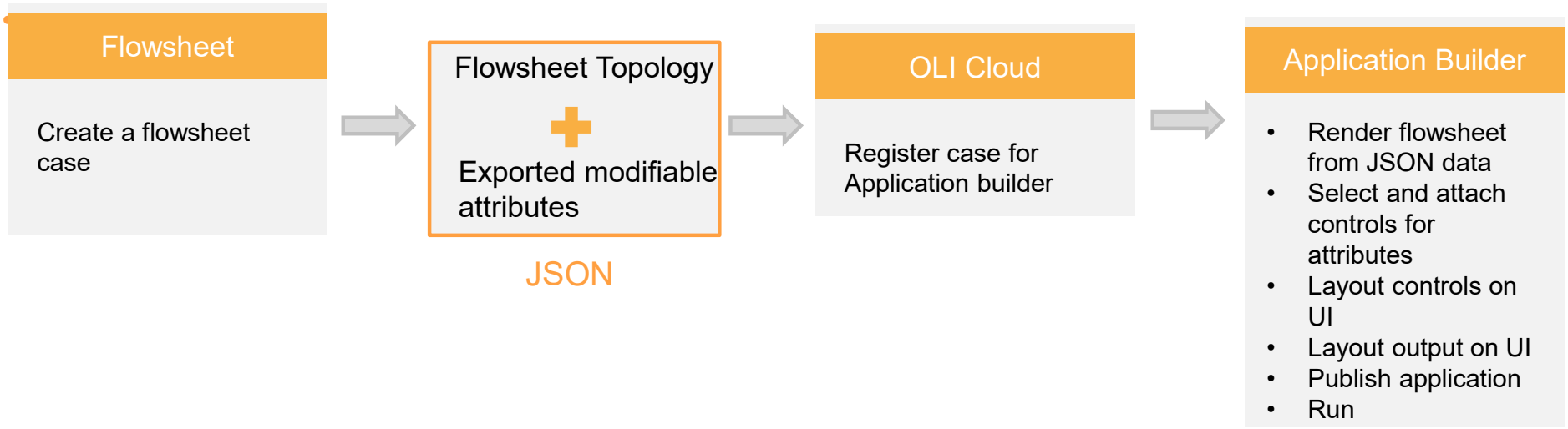
File storage
Used for storing user uploaded files e.g. chemistry model (.dbs)

Configuration & Results storage
Licensing information, configuration and application result and data storage

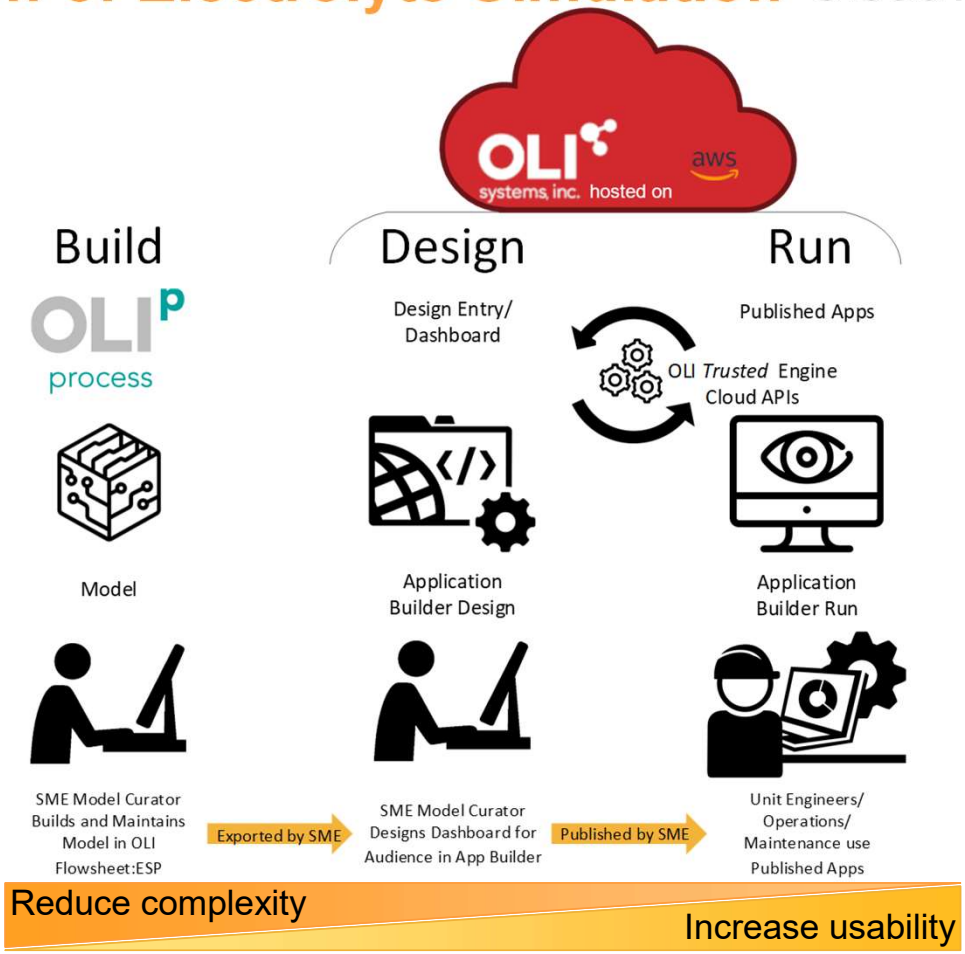
Temporary storage
In-memory data storage for quick retrieval of calculation results

OLI Application Builder: Introduction

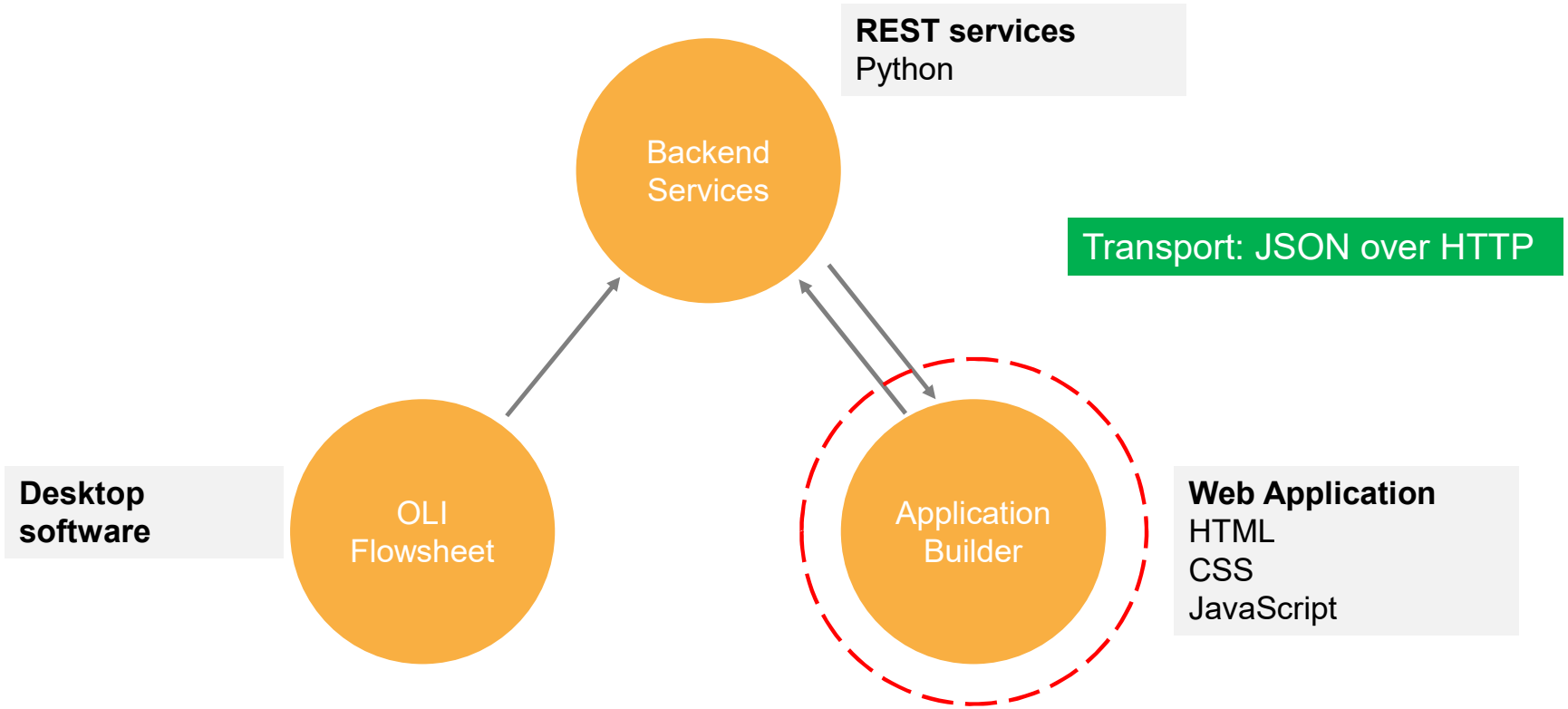
- Deploy easy-to-use cloud-based applications based on OLI Flowheet: ESP and run them directly in the web browser. Not necessary to install software locally
- Leverage existing OLI Flowsheet cases created by experts and enable operators/non-experts to quickly make defined changes and see the impact immediately minus the complexity
- Leverages OLI Process API in the backend to run the flowsheet calculations



Democratization of Electrolyte Simulation Cloud App Builder



OLI Application Builder: Architecture components



OLI Application Builder: components

- **OLI Flowsheet Package:** The package file uploaded from OLI Flowsheet ESP to the Application Builder backend
- **Channels:** Workspaces where groups of users can collaborate to design and publish applications
- **Designers:** Users who can login to Application Builder to design simple dashboards i.e., input and output controls based on the uploaded flowsheet model. Once the design is complete the **application** it can be **published**
- **Runners:** Users who can run the published applications by changing inputs available on the dashboard

OLI Application Builder: Demo

- **Demonstrate designing a basic application, publish and then run it**

Question and Answer Session

Start a conversation with the OLI Team

Schedule a deep dive on OLI's new pricing and tiered services

Contact us at www.olisystems.com/contact to arrange a 1x1 meeting with the OLI sales team to discuss your personalized pricing and services plans

Email sales@olisystems.com if you have any immediate questions

Join the OLI LinkedIn group

Follow OLI on LinkedIn

Follow OLI on Twitter

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Check out our blogs at www.olisystems/blog

Thanks for your attention!

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