

Automating Research Workflows

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Background

A brief history of data science at BlackRock

Why?

- **Analytical research and development environments available to researchers and scientists across the firm**
- **Best in class free and open source software tools**
- **On demand resourcing for users**
- **User configurability of research tools and environment**
- **User session resource isolation and security**

How?



GitLab



What?

- **Environmental, Social and Governance alert mechanism for portfolio managers based on positioning of funds**
- **Compliance tool to evaluate orders against equity thresholds**
- **Outlier check to improve quality check of daily portfolio analytics**
- **Pricing models for variety of complex financial instruments**
- **Recommender tool based on ticket similarity model**
- **Dashboard to track retail fund activities**

Automate scheduling, manage exceptions, and provide transparency for complex Kubernetes daily batch processes.

Workflows

Argo

- Intuit + KubeFlow
- Workflow as CRD



Brigade

- Microsoft
- Workflows as JS
- Scheduled on Kubernetes Pods

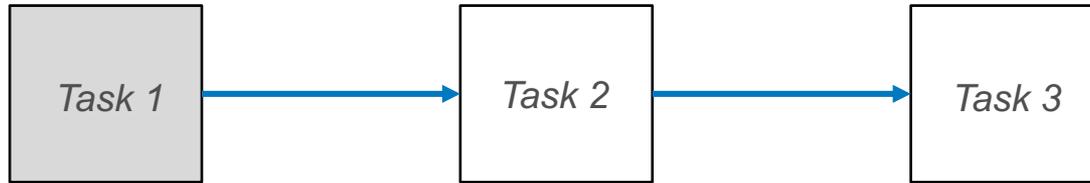


Airflow

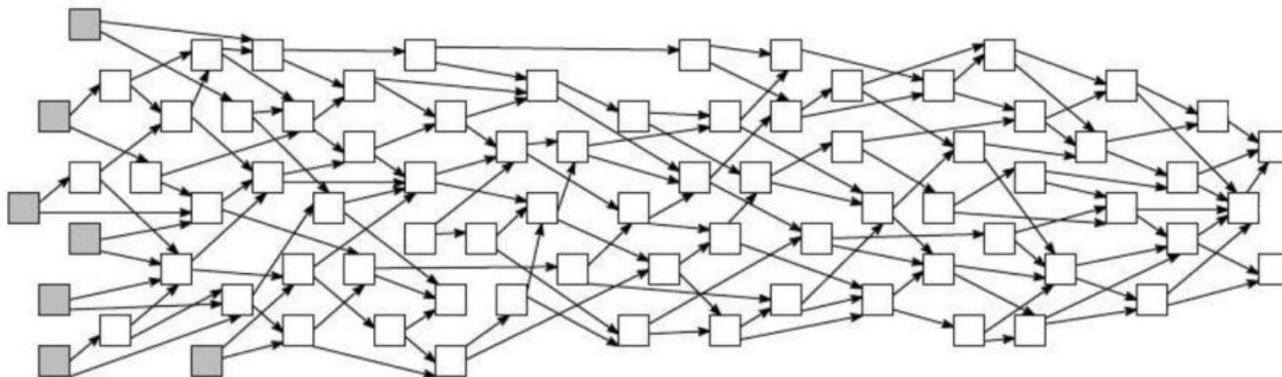
- Apache (Incubator)
- Workflows as Python
- Pluggable Operators



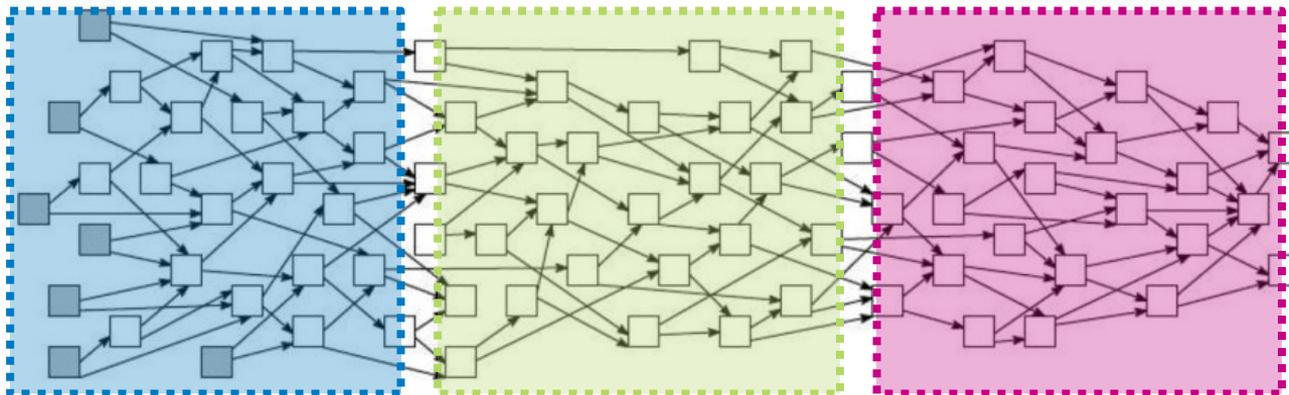
Simple Idealized



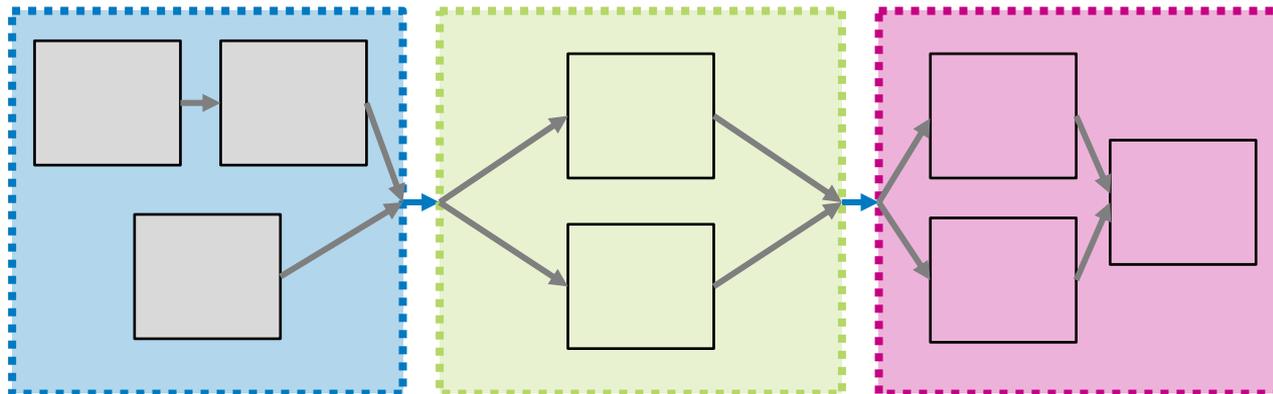
Complex Reality



Complex Reality: Breaking it apart

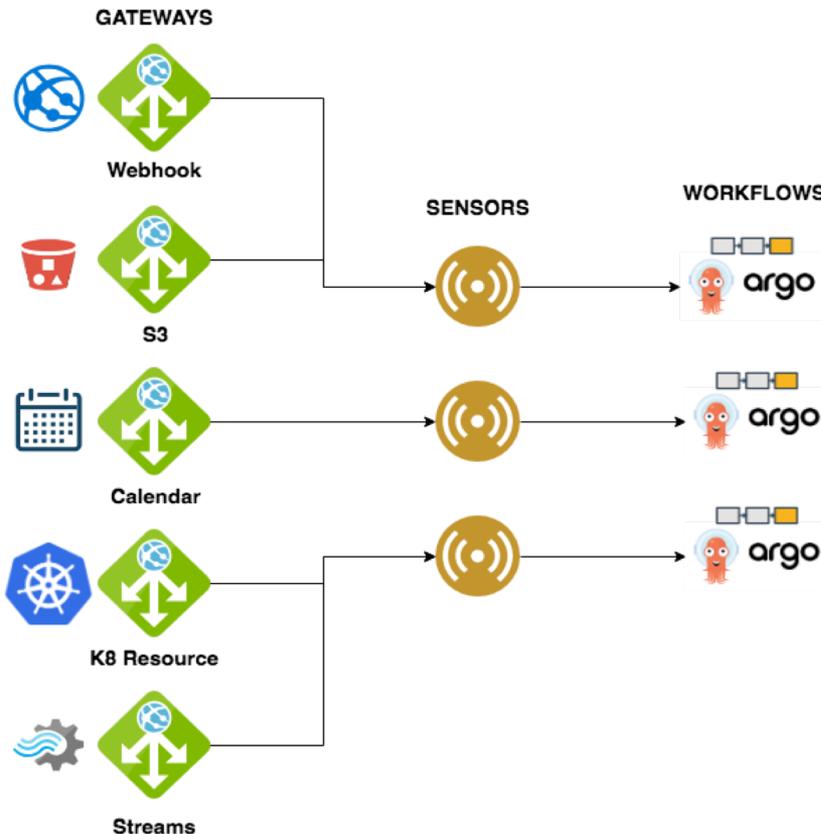


Complex Reality: Simplified

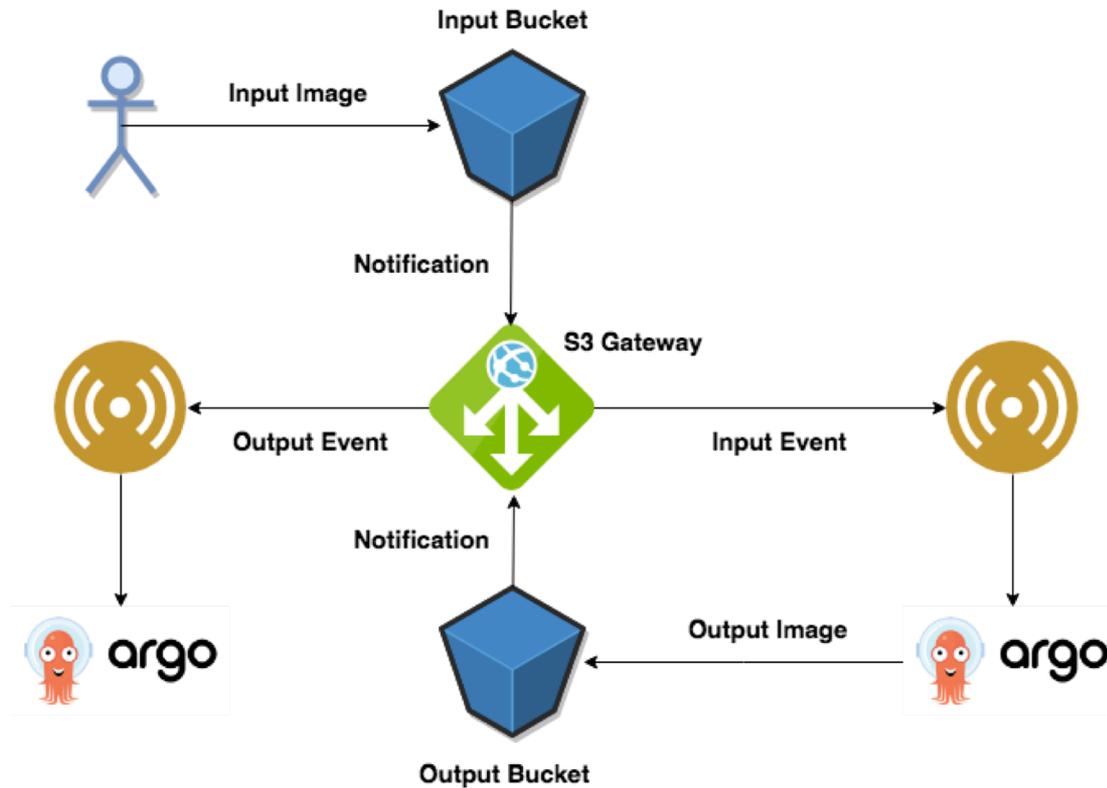


Automation

- **Gateways** - produce events internally or process events that originate external to the gateways.
- **Sensors** - define a set of event dependencies and trigger actions.



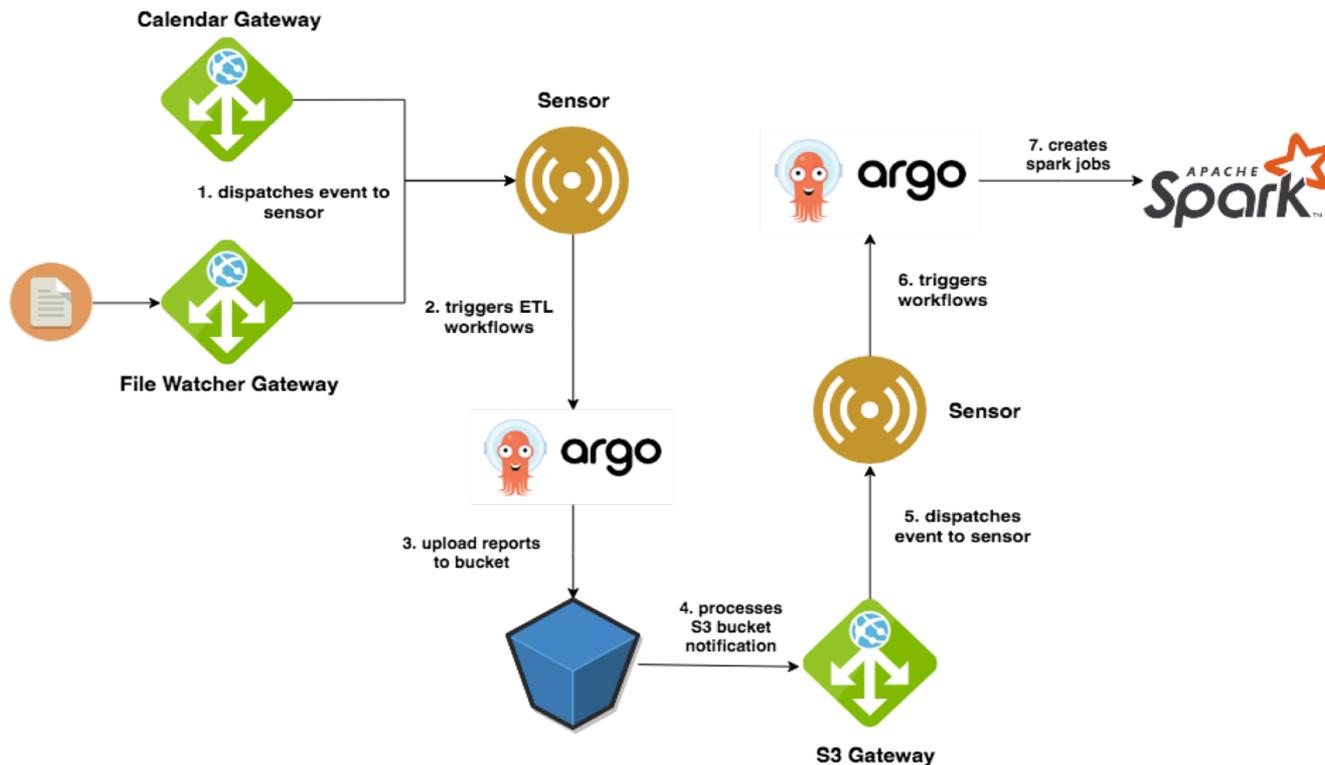
Demo – Image Processing



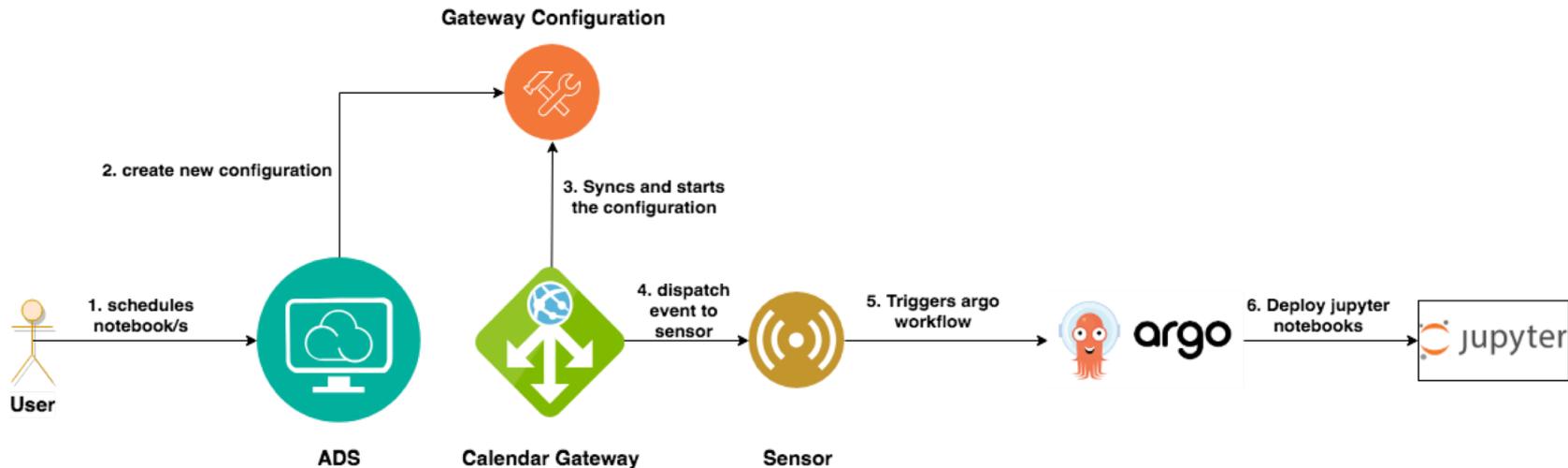
Features

- **Kubernetes native**
- **Runtime agnostic**
- **Lightweight**
- **Easily extensible**
- **Configurable at runtime**

Data Sourcing



- Schedule workflows to acquire, process, validate and deliver vendor data feeds to users in a consistent & systematic approach.



Fixed Income Notebooks

- Help BlackRock investment teams deliver market leading performance (alpha) to their clients
- Used for risk scaling, time-series transformation, running optimizations for financial models
- Includes equity models, commodity models which run on certain frequency like daily, monthly etc.
- Schedule varies from a normal cron job to a complex calendar logic.

Takeaways

- **Automation is a growing area of interest**
- **Staying relevant in the open source community**
- **Argo Events project scope is expanding**
- **Standardizing eventing platform using CloudEvents specifications.**

More Resources

- Argo Project Website - <https://argoproj.github.io/>
- Argo Events Github - <https://github.com/argoproj/argo-events>
- BlackRock Engineering Blog - <https://medium.com/blackrock-engineering/>
- BlackRock Homepage - <https://www.blackrock.com/>



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