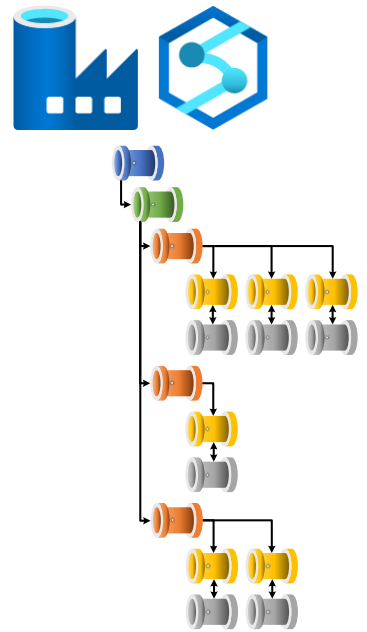
Creating a Metadata Driven Processing Framework



Using Azure Integration Pipelines

Paul Andrew | Group Manager & Analytics Architect

Microsoft® MVP Most Valuable Professional

avanade

@MrPaulAndrew

In/MrPaulAndrew

MrPaulAndrew.com

https://github.com/mrpaulandrew

CommunityEvents

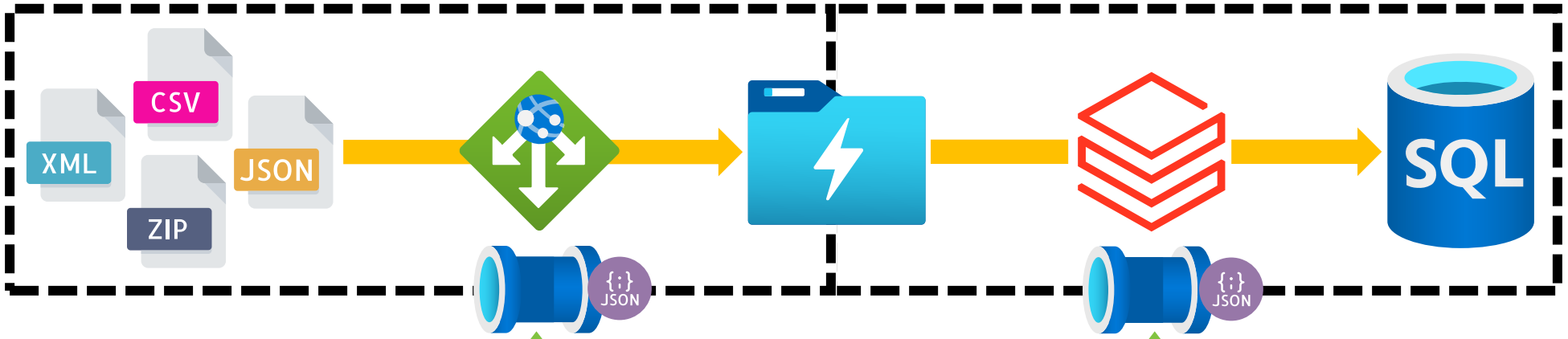
Demo code, content and slides from various community events.

C++

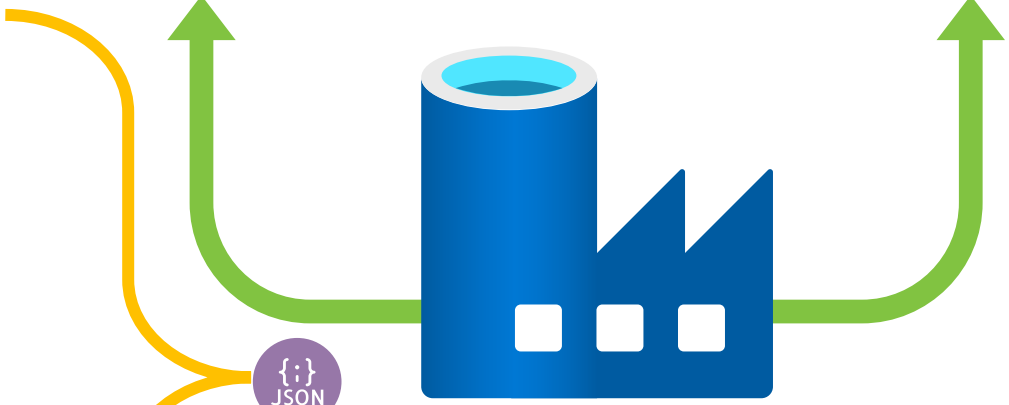
{Event/Location}-{Month}-{Year}

Data Factory – A Quick Overview

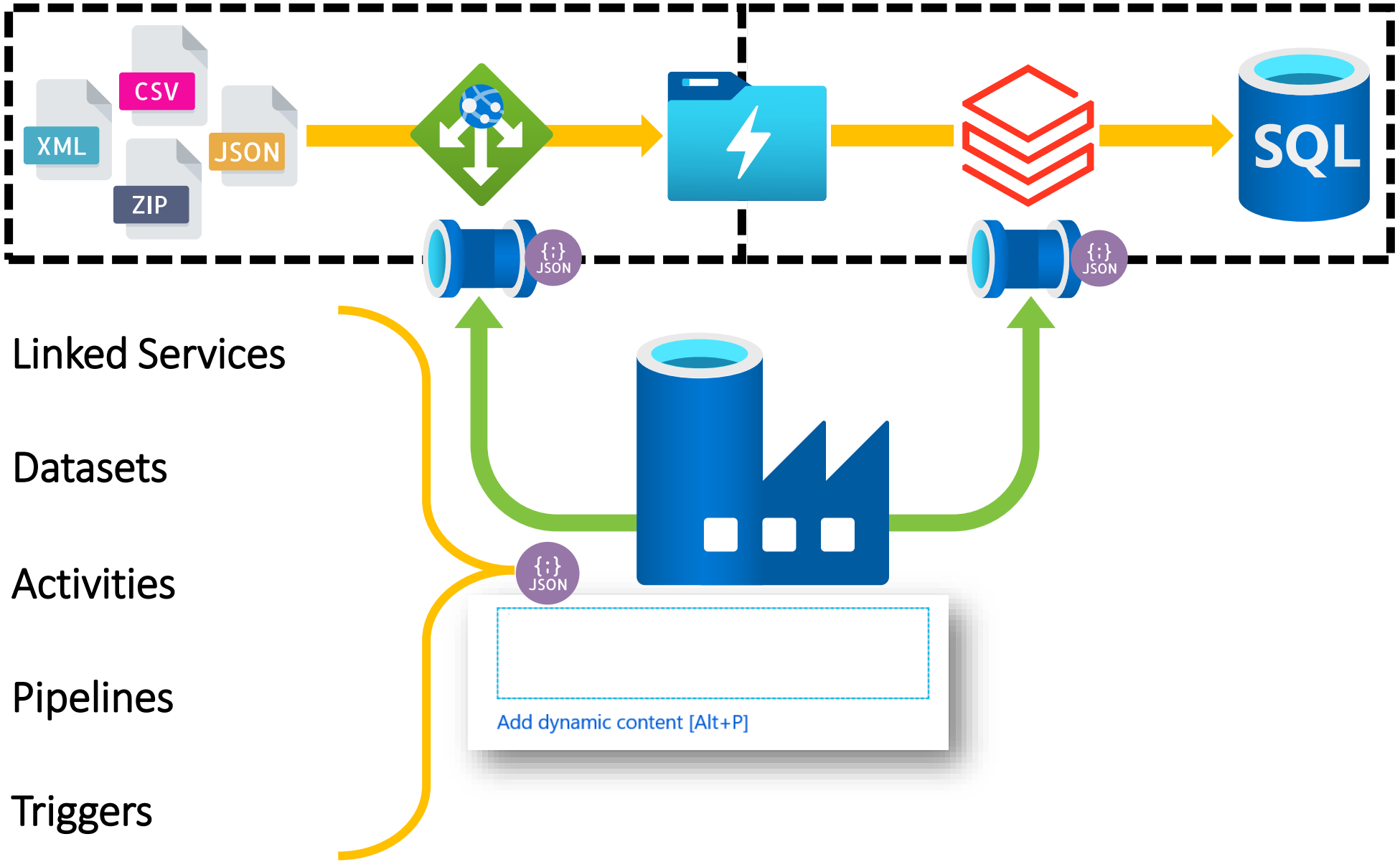
Data Factory A Quick Overview



1. Linked Services
2. Datasets
3. Activities
4. Pipelines
5. Triggers



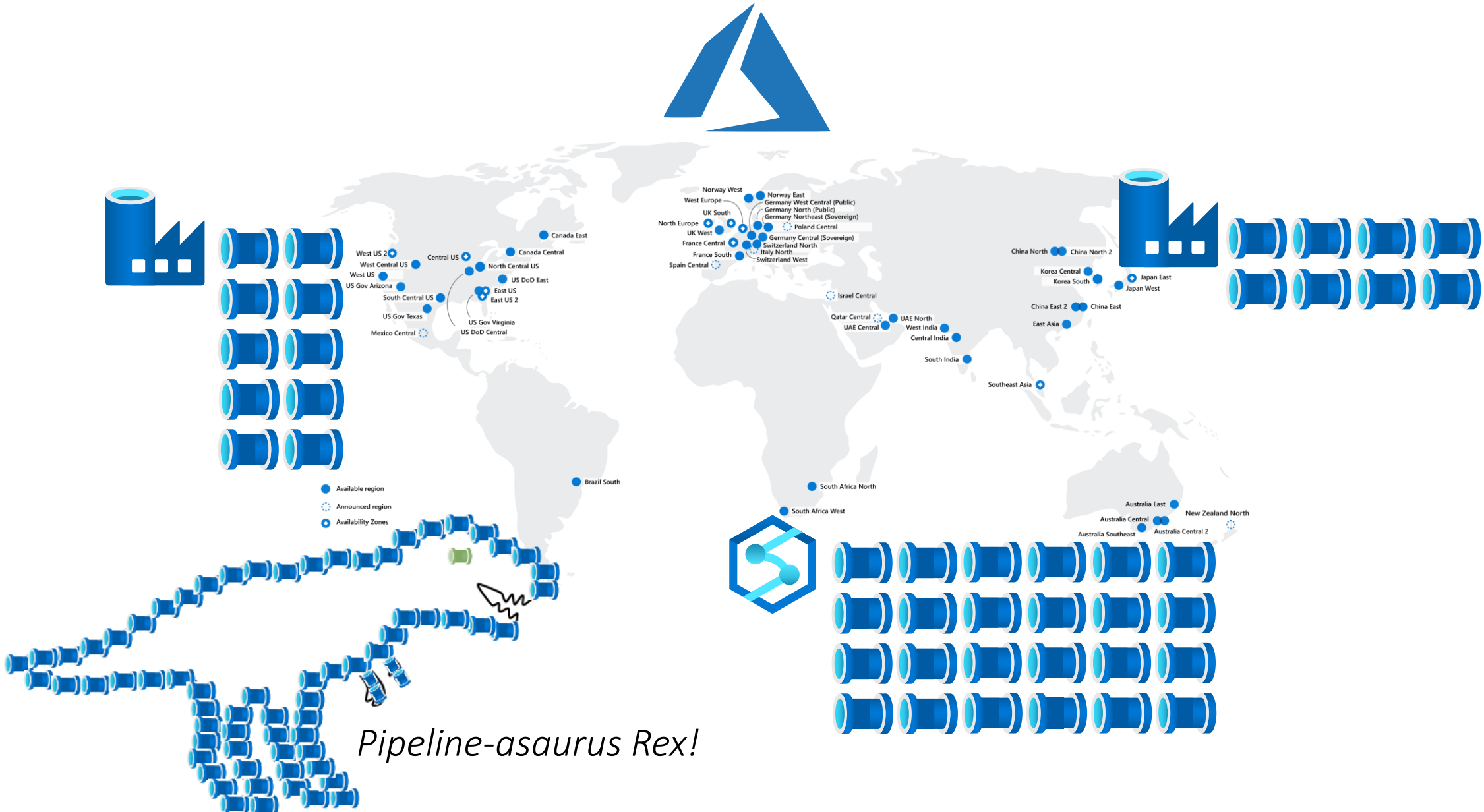
Data Factory Components – Add Dynamic Content



1. Linked Services
2. Datasets
3. Activities
4. Pipelines
5. Triggers

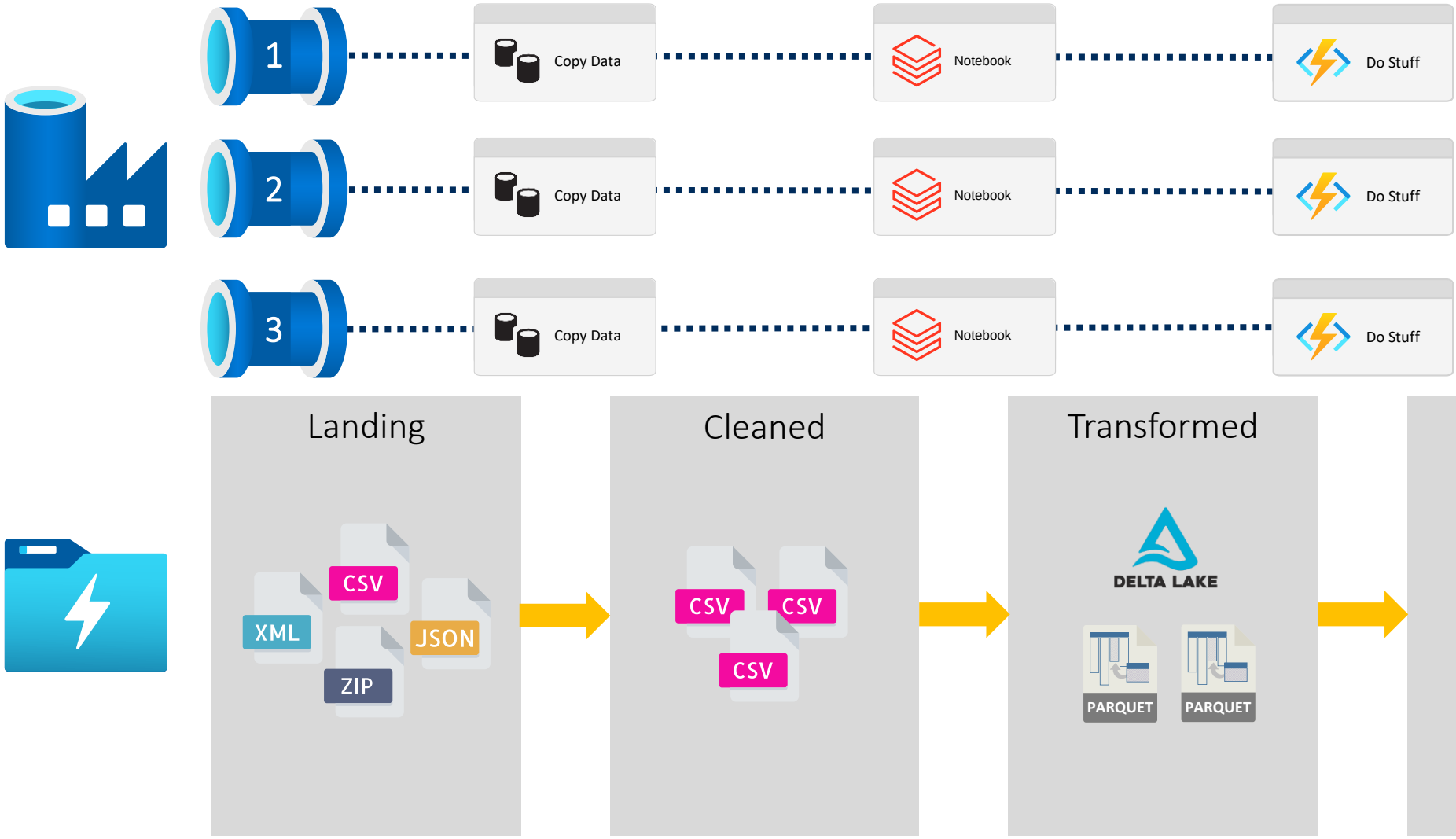
Problem

Problem: How should we structure our Integration Pipelines?



Pipeline-asaurus Rex!

Problem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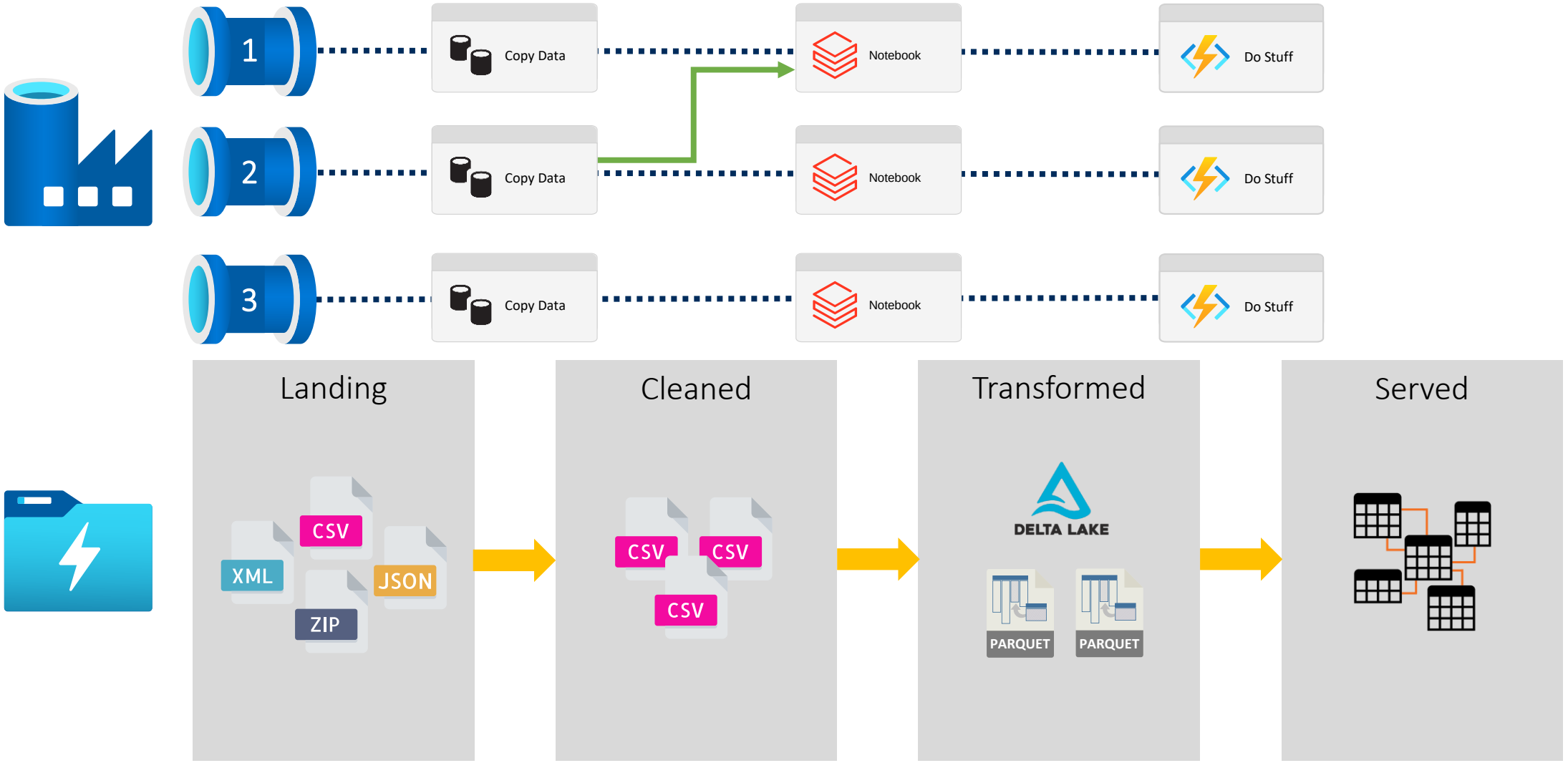
Served

Problem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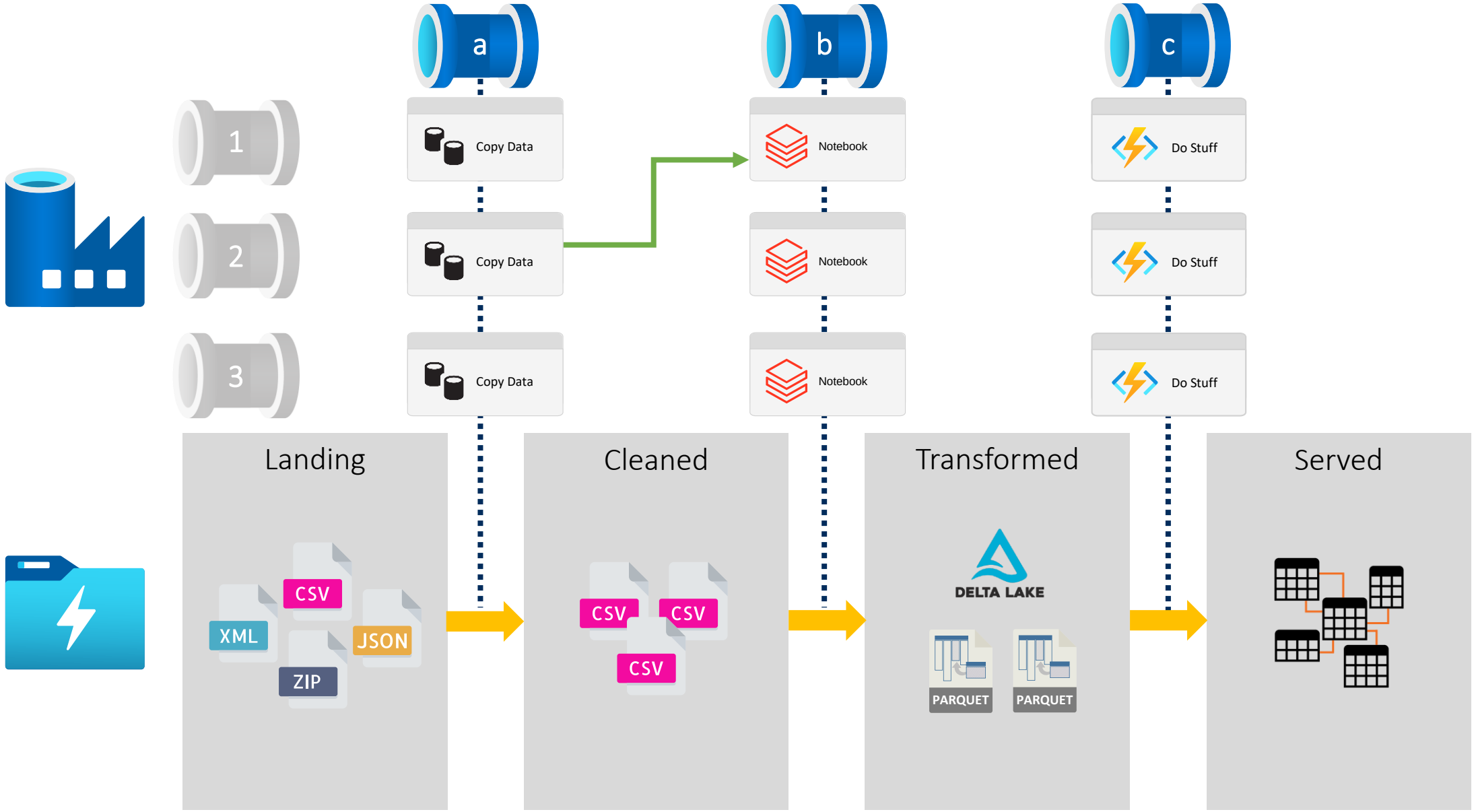
Problem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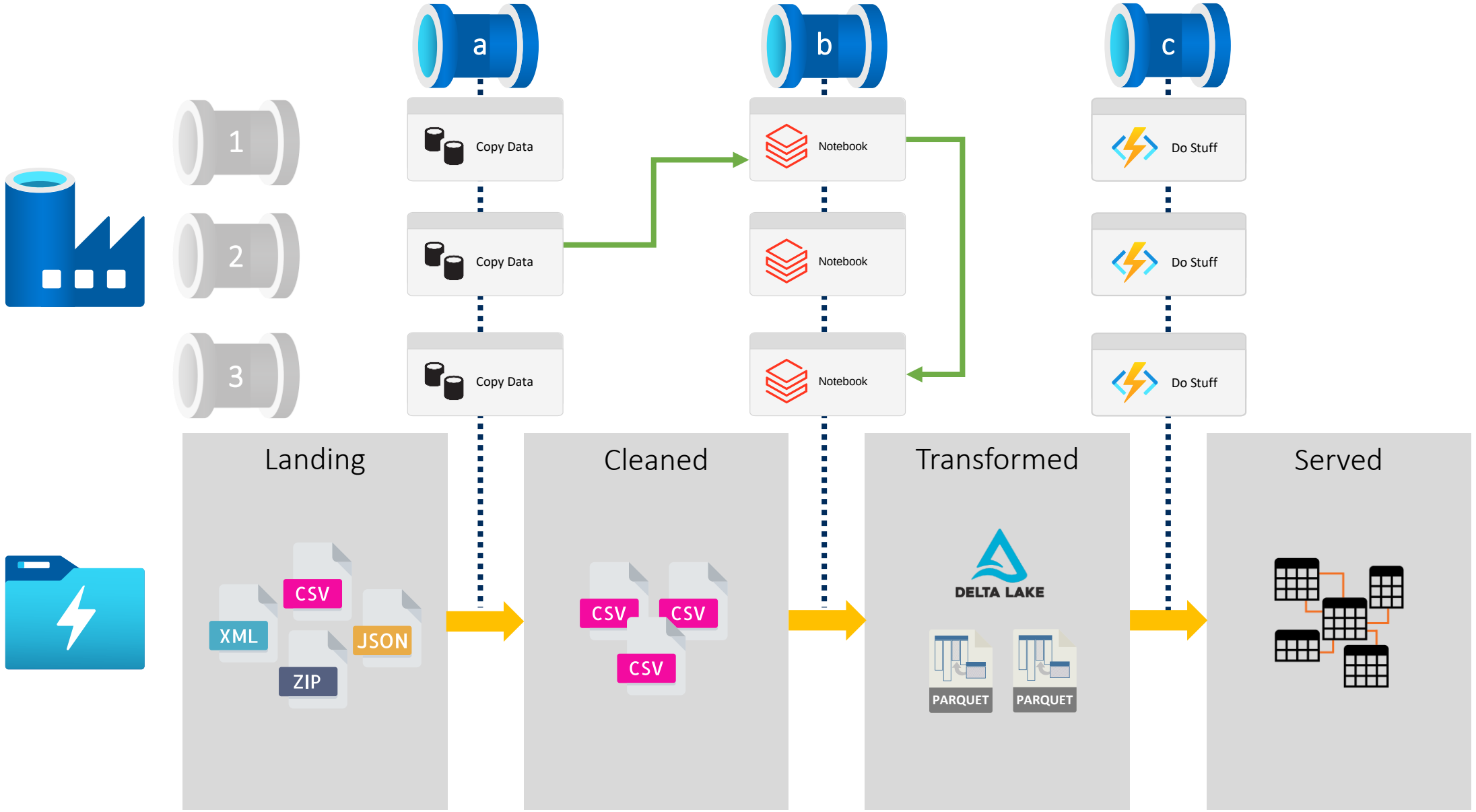
Problem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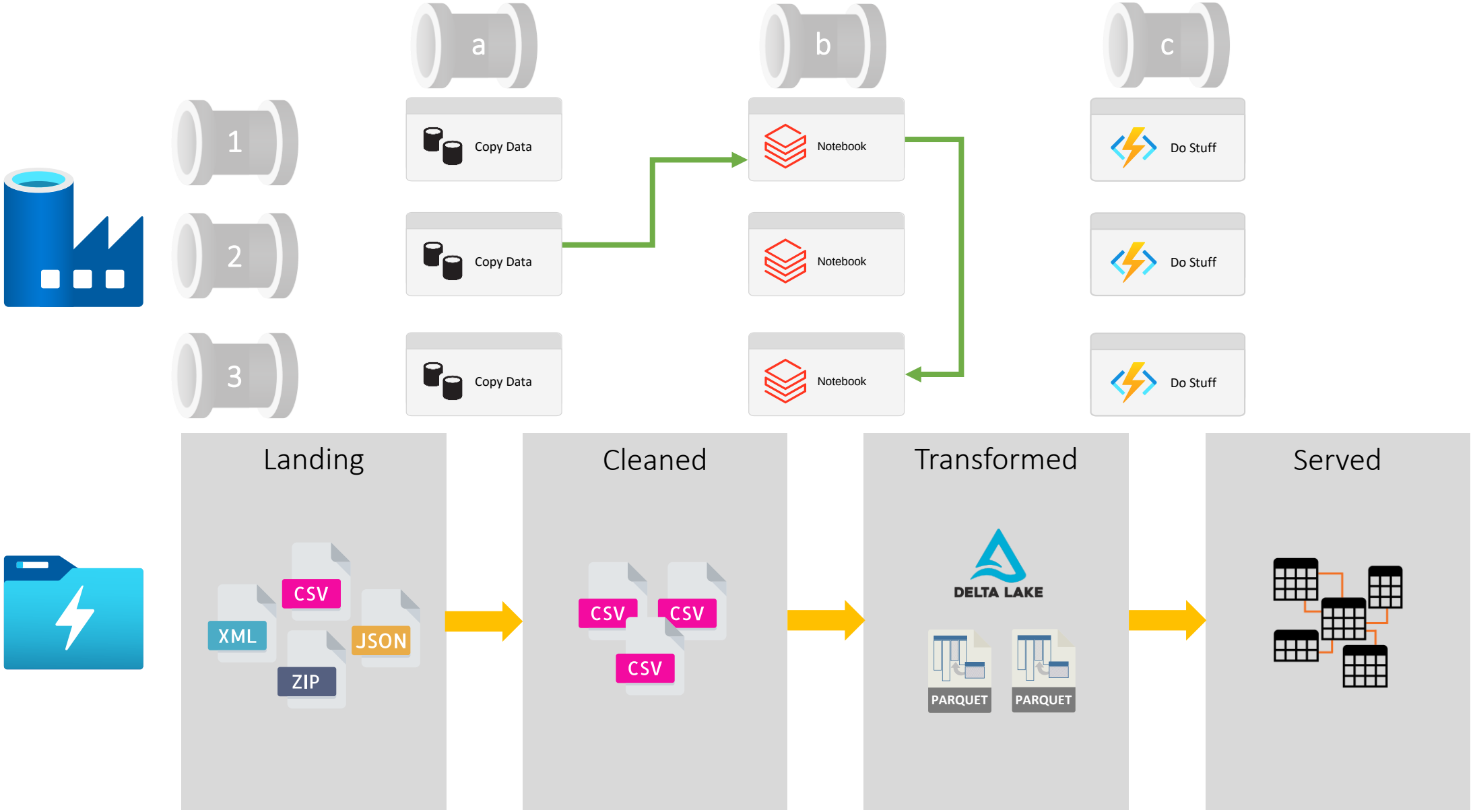
Problem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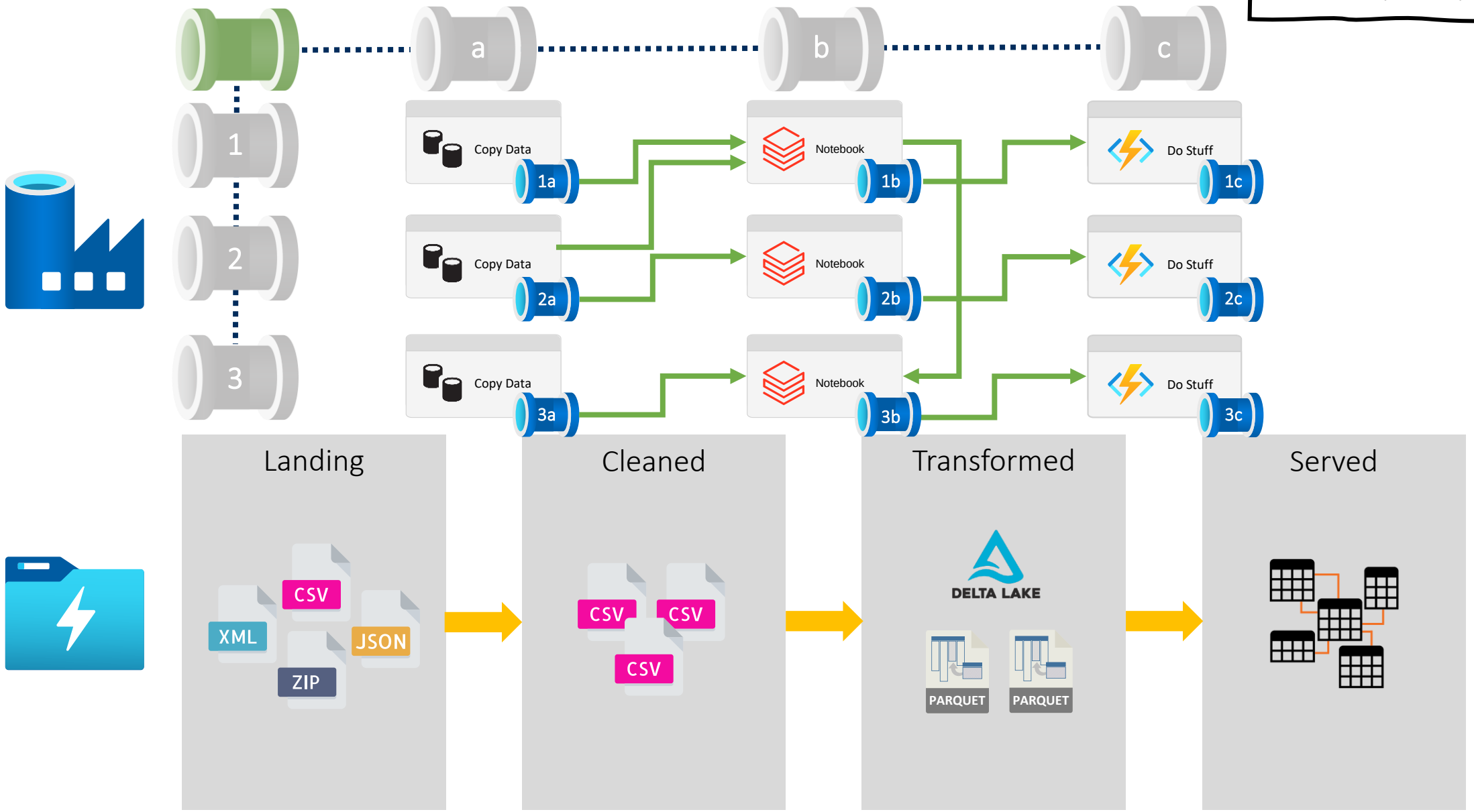
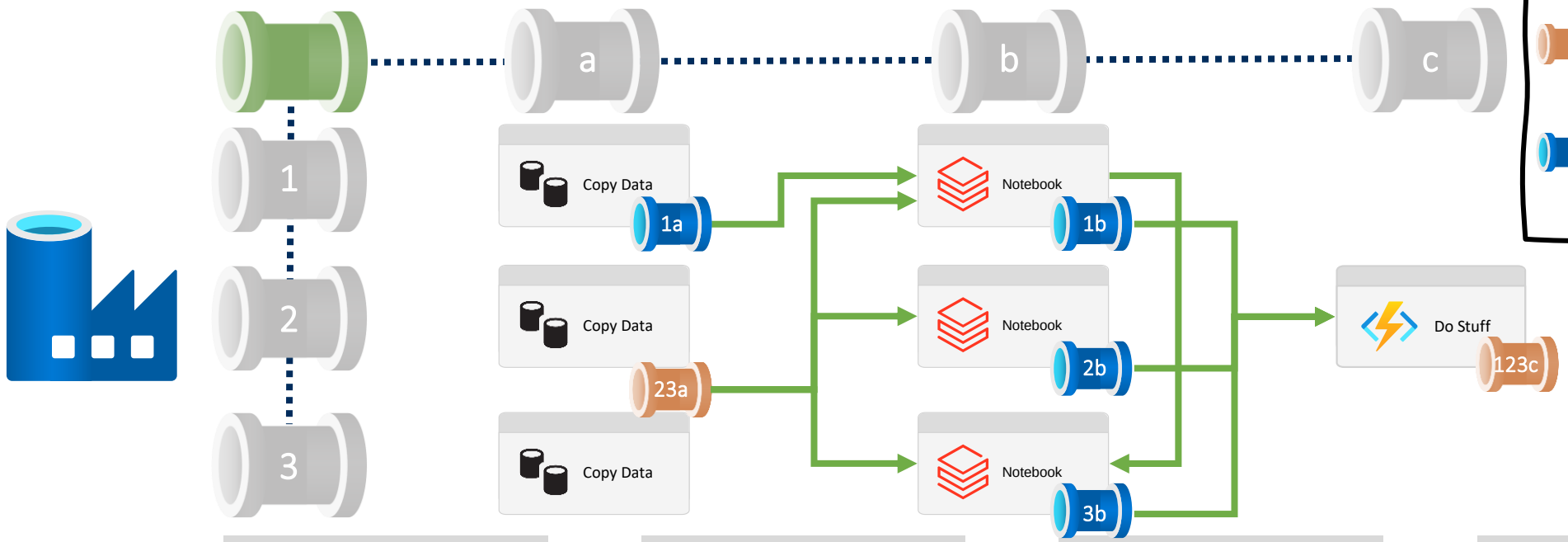
DELTA LAKE
PARQUET
PARQUET

Problem

Only 40 Activities per Pipeline.



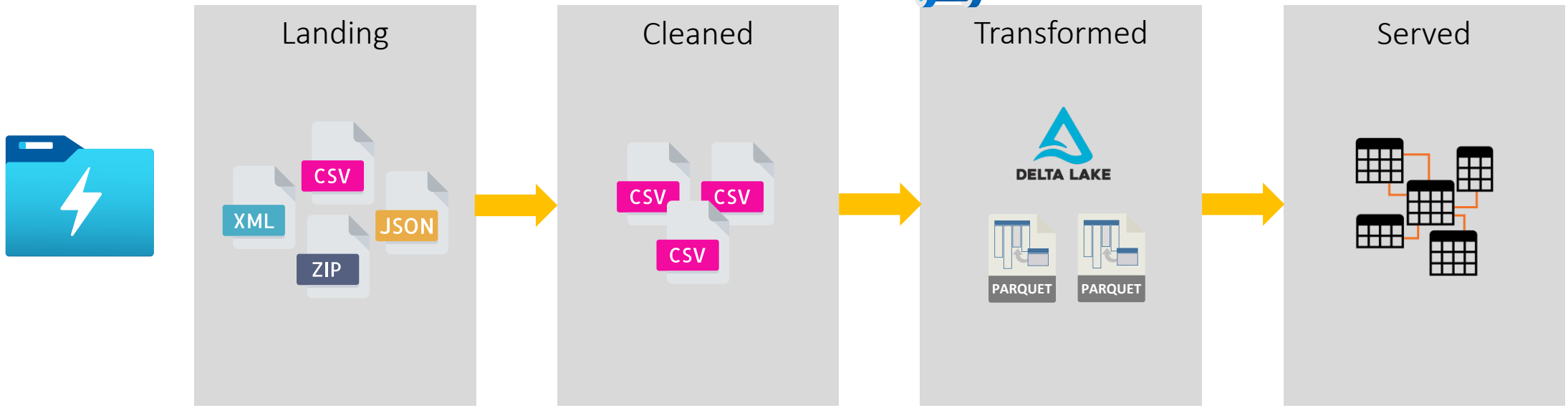
Problem



Grandparent pipeline for all processing.

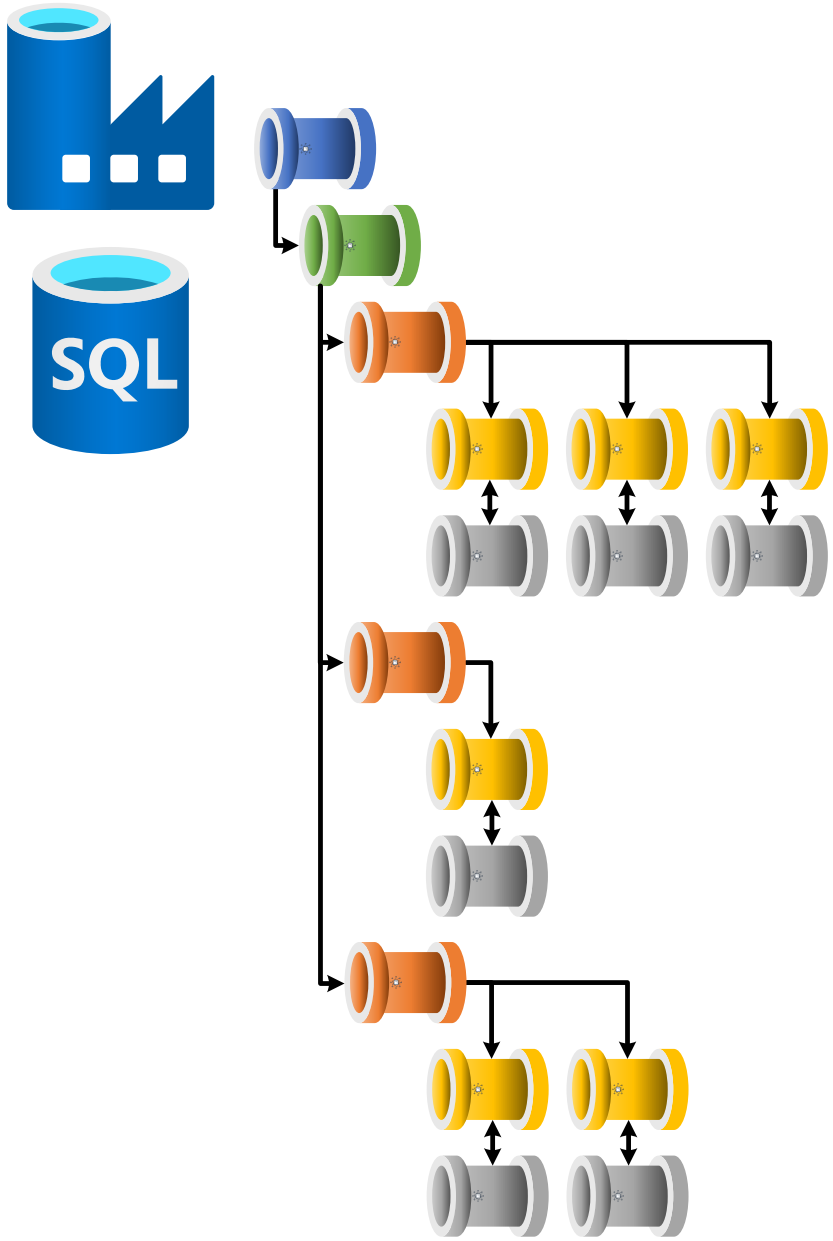
Parent pipeline to consolidate work.

Child pipelines for low level dependencies.

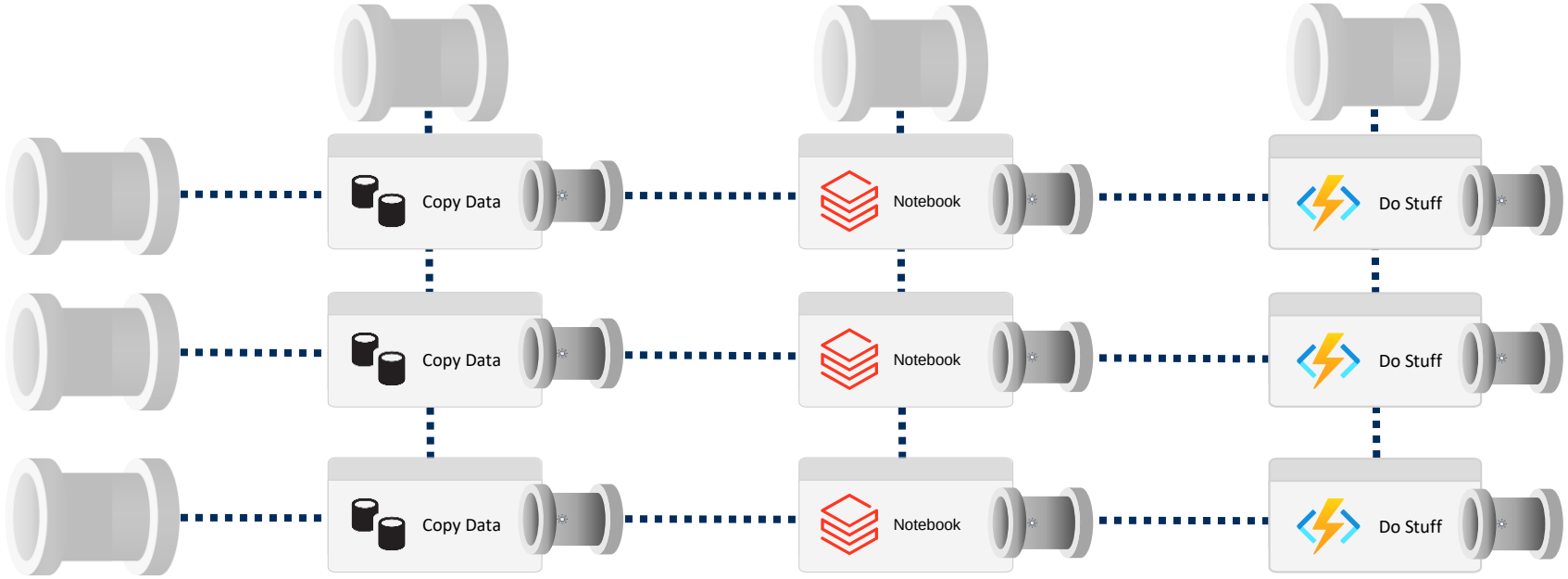


Solution

Solution: Use Metadata to Drive Data Factory Pipelines



Solution

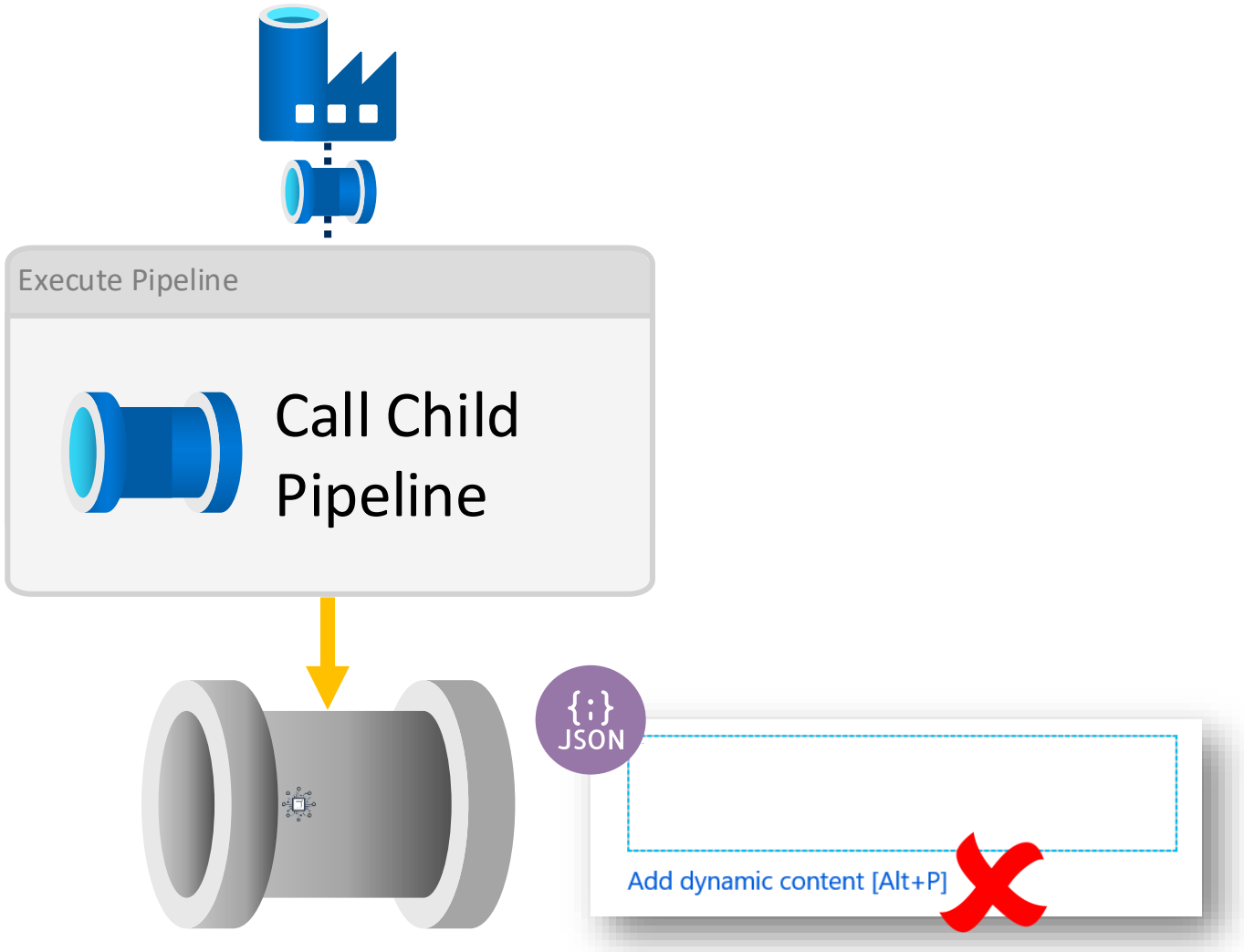


Stages
1
2
3

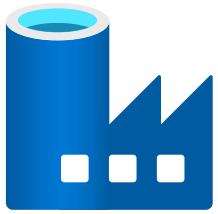
Pipelines
a
b
c
d
e
f
g
h
i

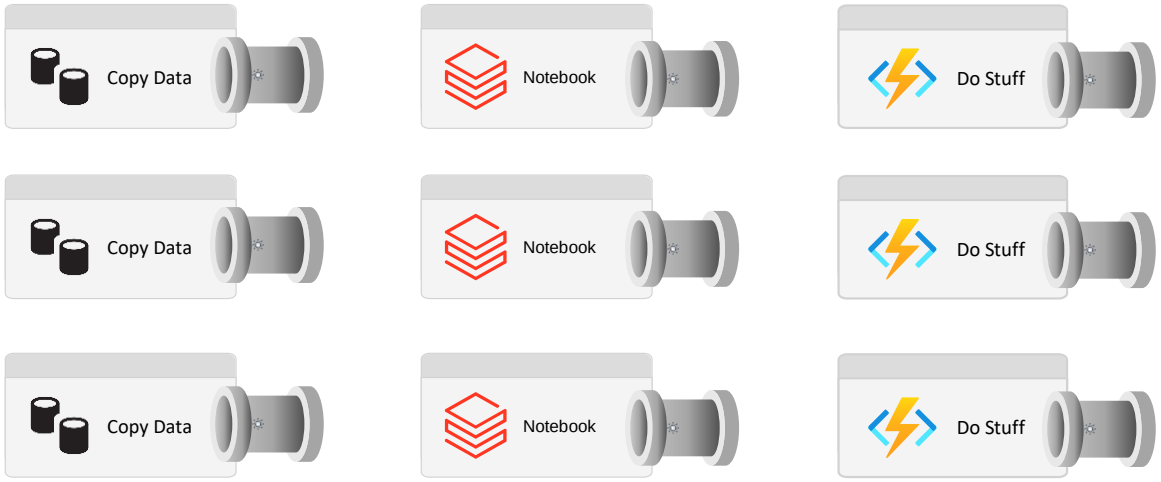
Stage	Pipeline
1	a
1	b
1	c
2	d
2	e
3	f
3	g
3	h
3	i

One More Problem



Calling Our Worker Pipelines



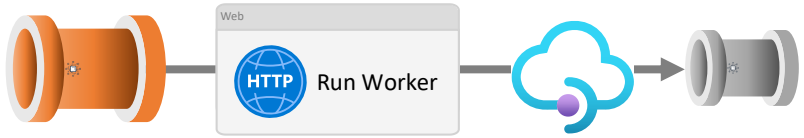


Stages
1
2
3

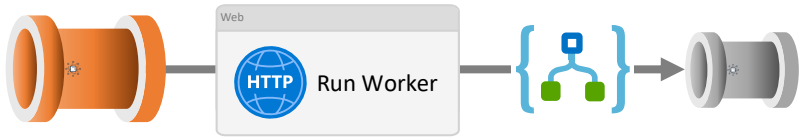
Pipelines
a
b
c
d
e
f
g
h
i

Stage	Pipeline
1	a
1	b
1	c
2	d
2	e
3	f
3	g
3	h
3	i

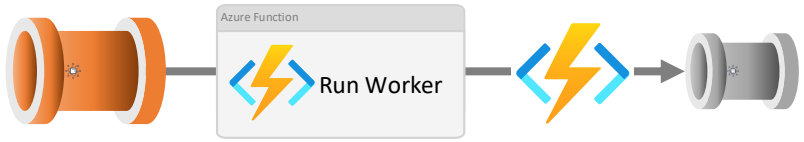
Option 1:



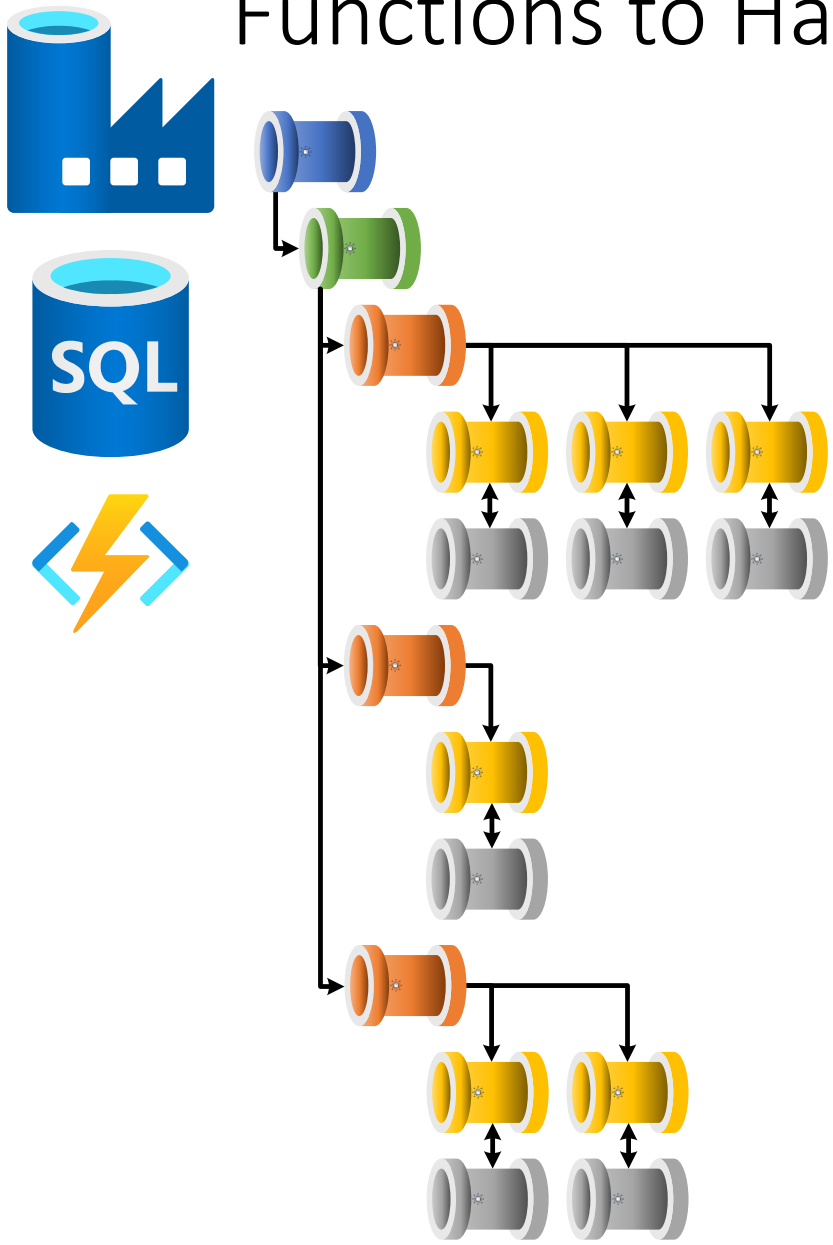
Option 2:



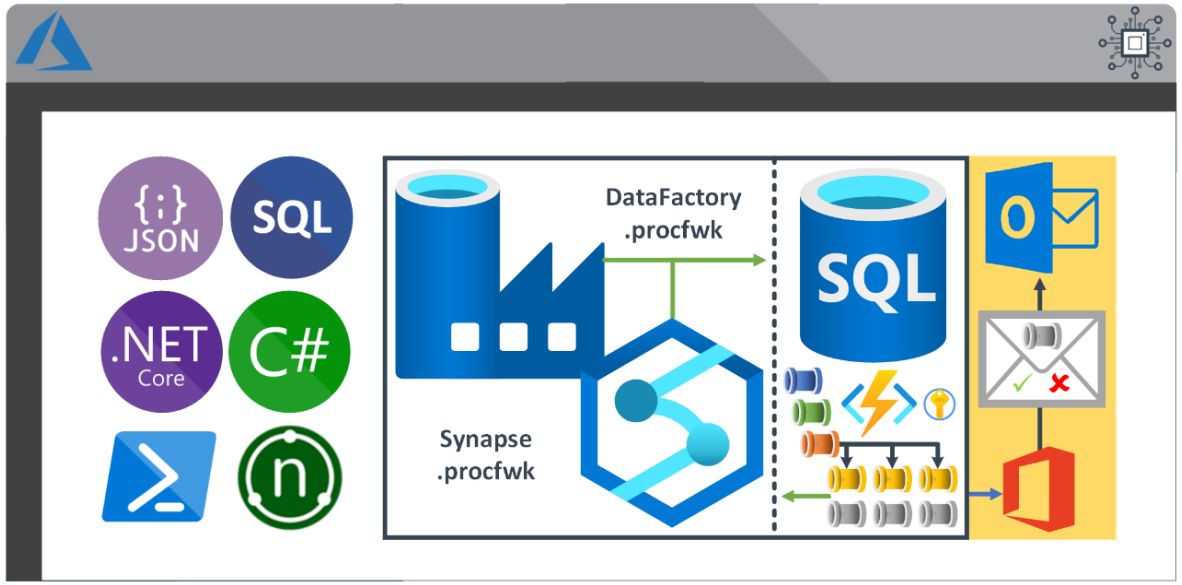
Option 3:



Solution: Use Metadata to Drive Data Factory Pipelines & Functions to Handle the Worker Execution

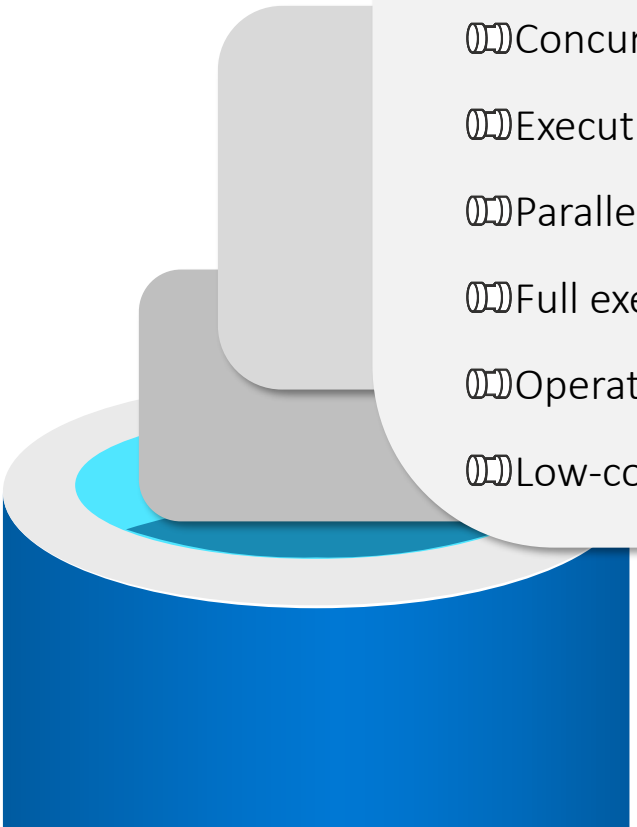


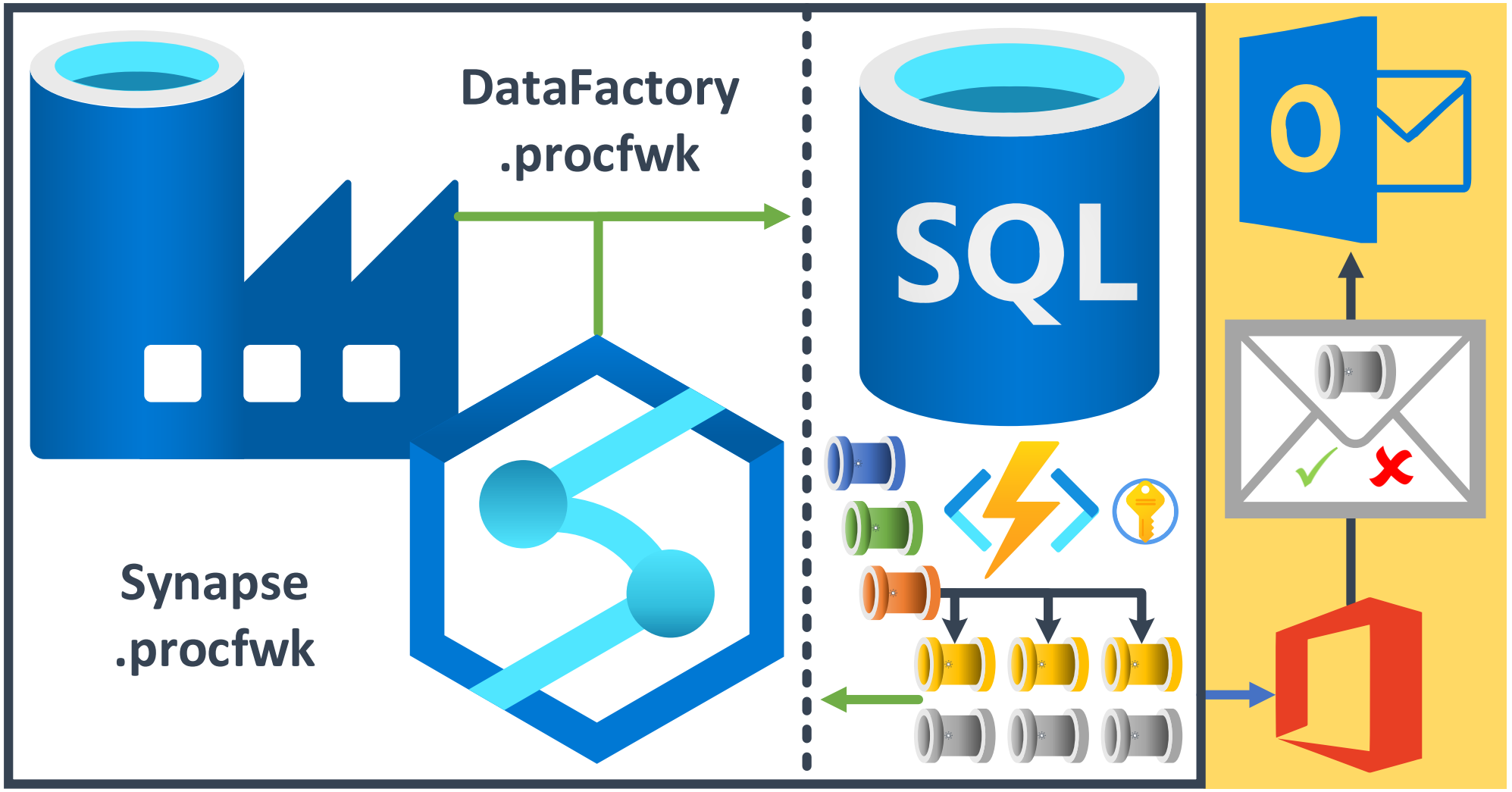
Introducing procfwk.com

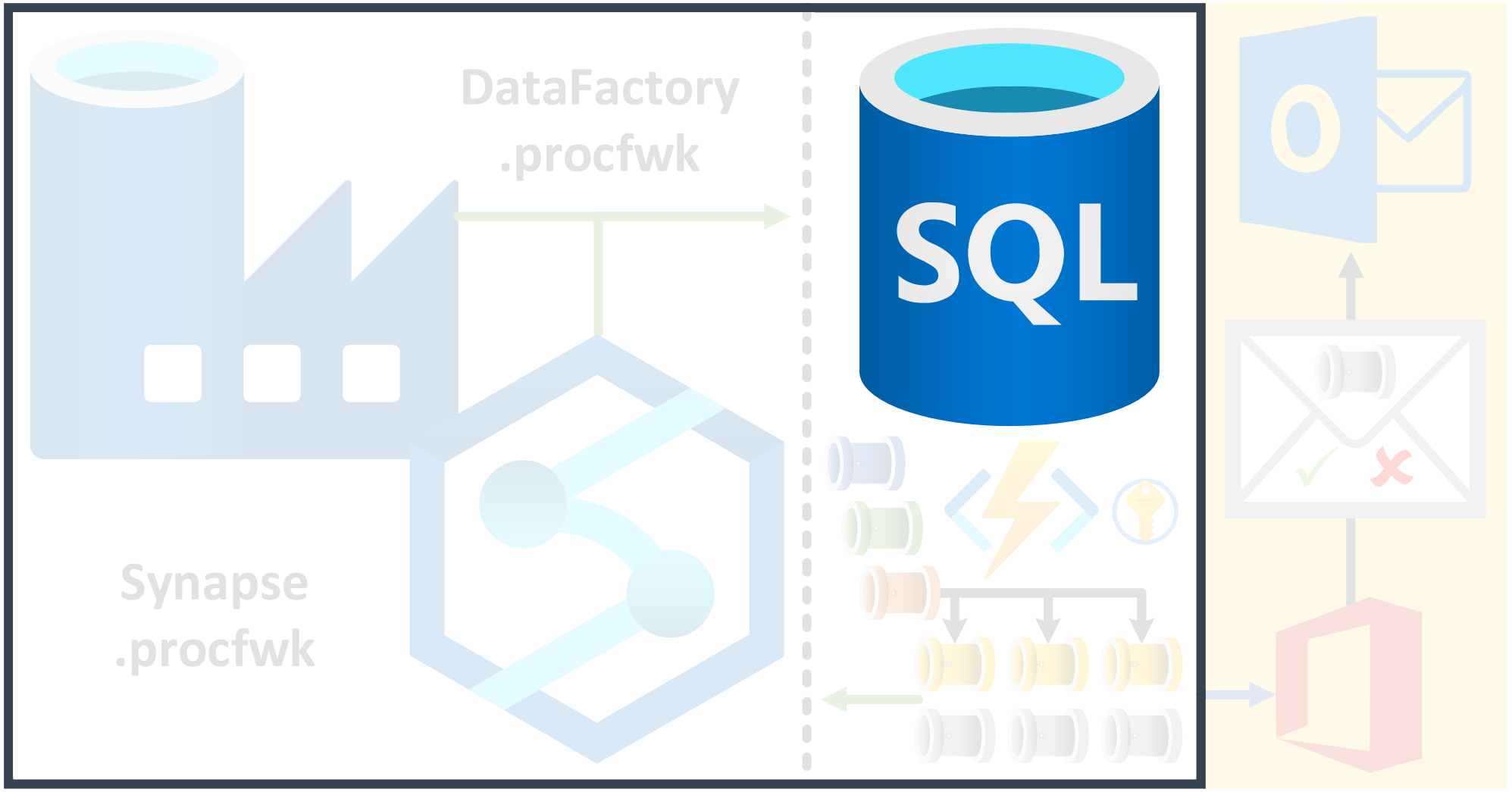


procfwk Features

- Granular metadata control.
- Metadata integrity checking.
- Global properties.
- Complete pipeline dependency chains.
- Concurrent batch executions.
- Execution restart-ability.
- Parallel execution stages.
- Full execution and error logs.
- Operational dashboarding.
- Low-cost orchestration.
- Disconnection between framework and worker pipelines.
- Cross Tenant/Subscription/Data Factory control flows.
- Pipeline parameter support.
- Simple troubleshooting.
- Easy deployment.
- Email alerting.
- Automated testing.
- Azure Key Vault integration.
- Is pipeline already running checks.




DataFactory
.procfwk
SQL
Synapse
.procfwk


DataFactory
.procfwk
SQL
Synapse
.procfwk

Framework Database

AlertOutcomes (procfwk)
- OutcomeBitPosition
- PipelineOutcomeStatus
- BitValue

PipelineAlertLink (procfwk)
- AlertId
- PipelineId
- RecipientId
- OutcomesBitValue
- Enabled

Recipients (procfwk)
- RecipientId
- Name
- EmailAddress
- MessagePreference
- Enabled

Batches (procfwk)
- BatchId
- BatchName
- BatchDescription
- Enabled

PipelineParameters (procfwk)
- ParameterId
- PipelineId
- ParameterName
- ParameterValue
- ParameterValueLastUsed

Pipelines (procfwk)
- PipelineId
- OrchestratorId
- StageId
- PipelineName
- LogicalPredecessorId
- Enabled

BatchStageLink (procfwk)
- BatchId
- StageId

PipelineDependencies (procfwk)
- DependencyId
- PipelineId
- DependantPipelineId

Stages (procfwk)
- StageId
- StageName
- StageDescription
- Enabled

Orchestrators (procfwk)
- OrchestratorId
- OrchestratorName
- OrchestratorType
- IsFrameworkOrchestrator
- ResourceGroupName
- SubscriptionId
- Description

PipelineAuthLink (procfwk)
- AuthId
- PipelineId
- OrchestratorId
- CredentialId

Subscriptions (procfwk)
- SubscriptionId
- Name
- Description
- TenantId

ServicePrincipals (dbo)
- CredentialId
- PrincipalName
- PrincipalId
- PrincipalSecret
- PrincipalIdUrl
- PrincipalSecretUrl

Tenants (procfwk)
- TenantId
- Name
- Description

Configuration & Behaviour

Properties (procfwk)
- PropertyId
- PropertyName
- PropertyValue
- Description
- ValidFrom
- ValidTo

Core Metadata

Execution Handling

BatchExecution (procfwk)
- BatchId
- ExecutionId
- BatchName
- BatchStatus
- StartDateTime
- EndDateTime

ExecutionLog (procfwk)
- LogId
- LocalExecutionId
- StageId
- PipelineId
- CallingDataFactoryName
- ResourceGroupName
- DataFactoryName
- PipelineName
- StartDateTime
- PipelineStatus
- EndDateTime
- AdfPipelineRunId
- PipelineParamsUsed

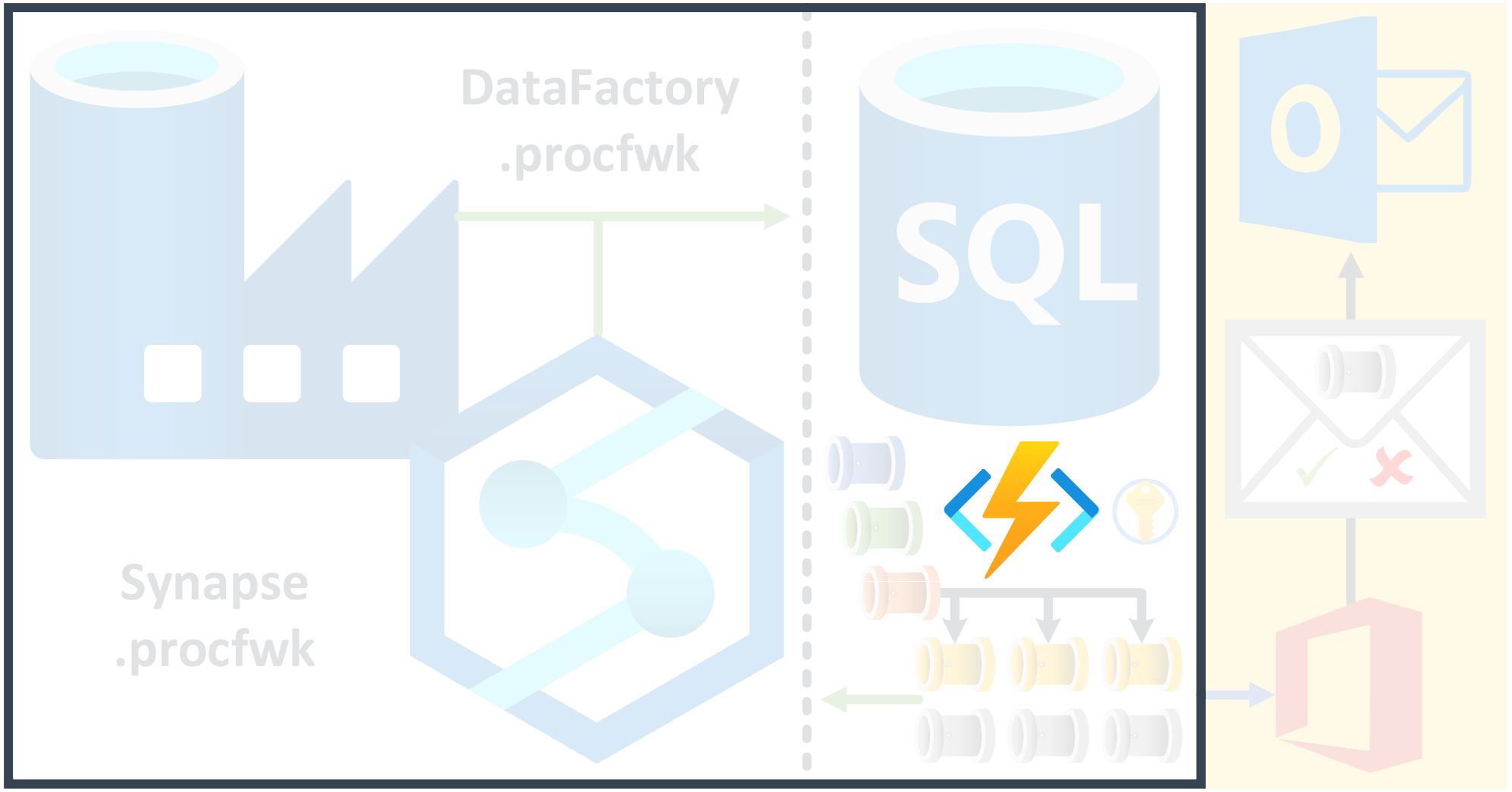
CurrentExecution (procfwk)
- LocalExecutionId
- StageId
- PipelineId
- CallingDataFactoryName
- ResourceGroupName
- DataFactoryName
- PipelineName
- StartDateTime
- PipelineStatus
- LastStatusCheckDateTime
- EndDateTime
- IsBlocked
- AdfPipelineRunId
- PipelineParamsUsed

ErrorLog (procfwk)
- LogId
- LocalExecutionId
- AdfPipelineRunId
- ActivityRunId
- ActivityName
- ActivityType
- ErrorCode
- ErrorType
- ErrorMessage

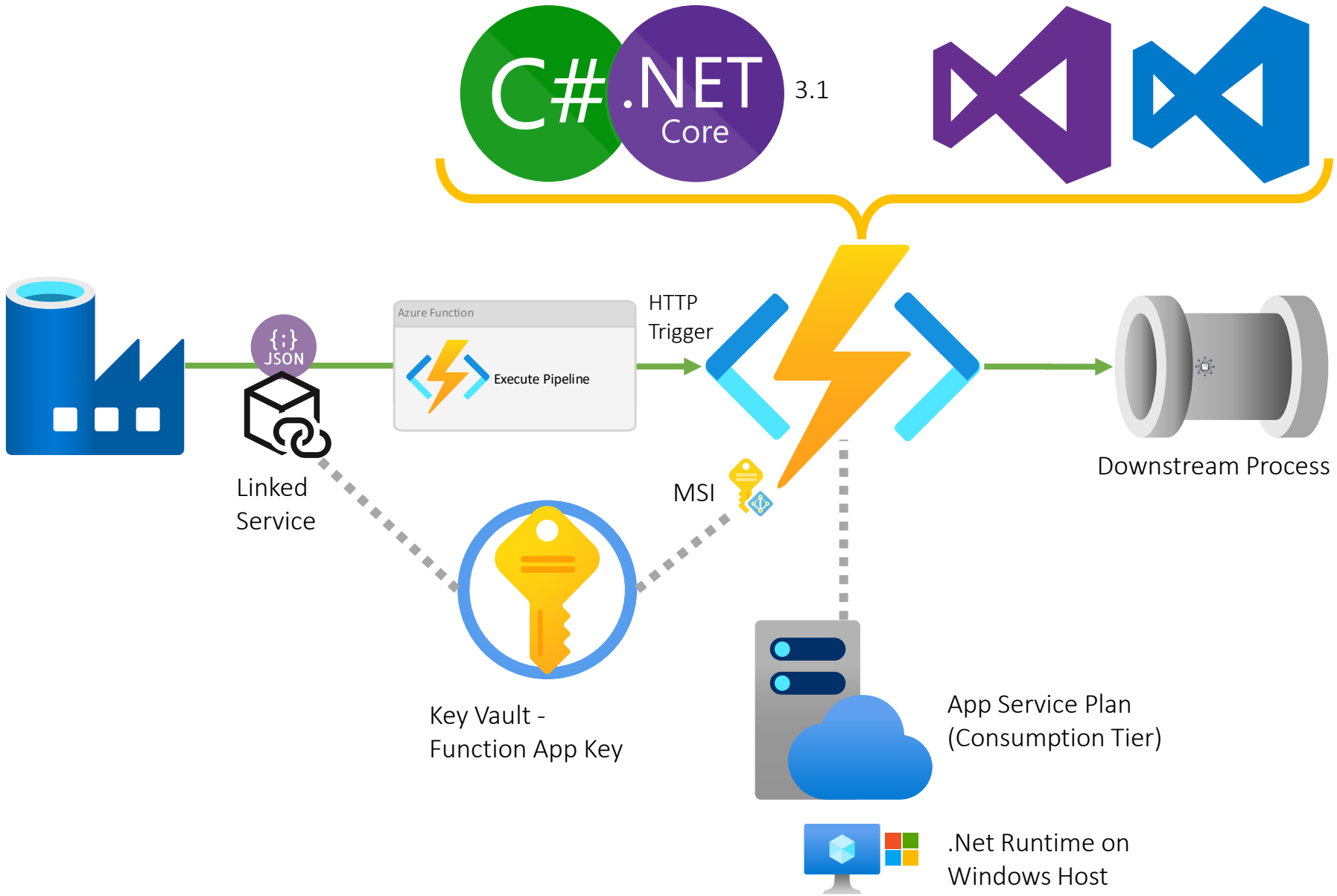
Location & Authentication

Email Alerting

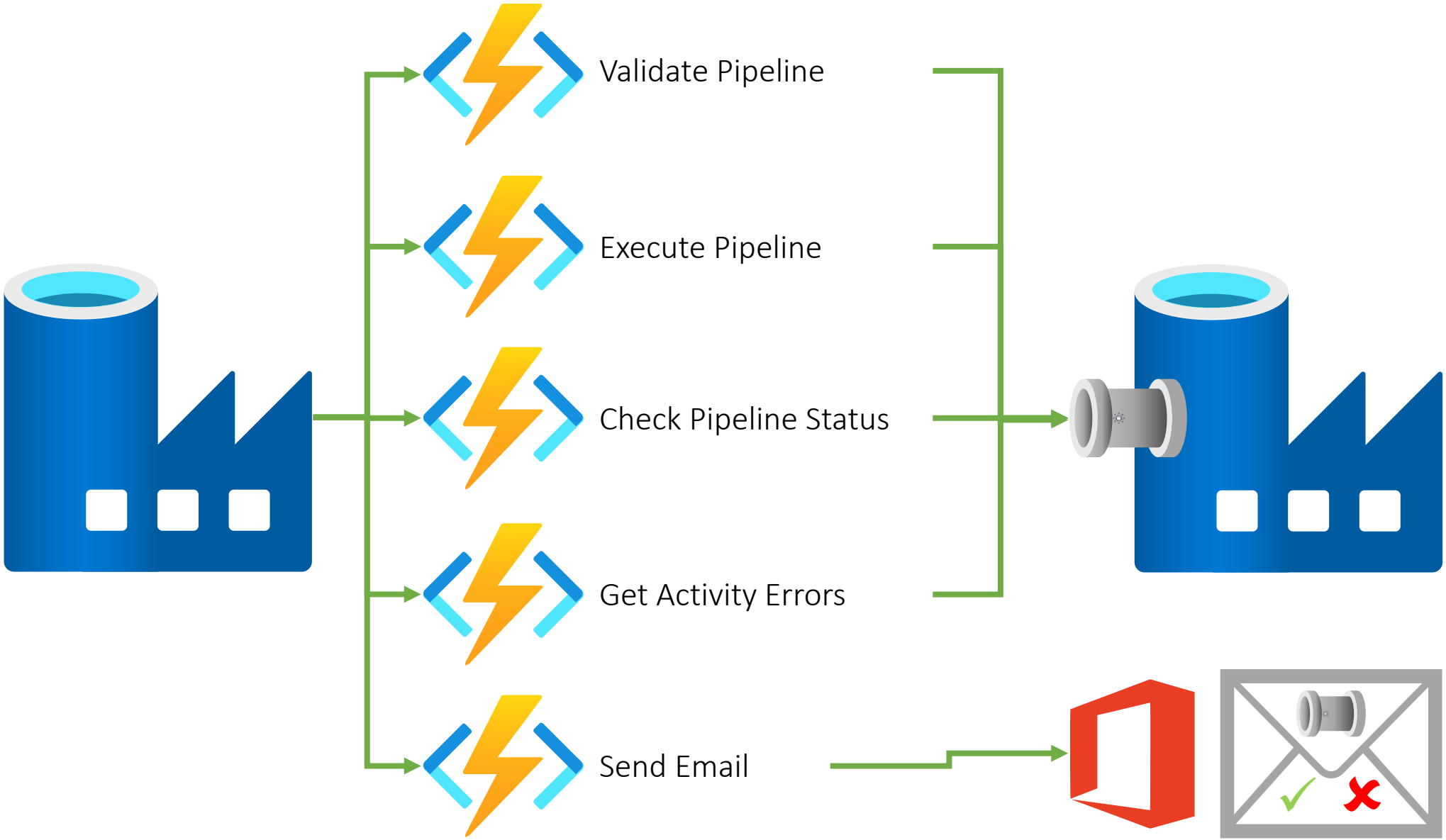
Runtime & Logging

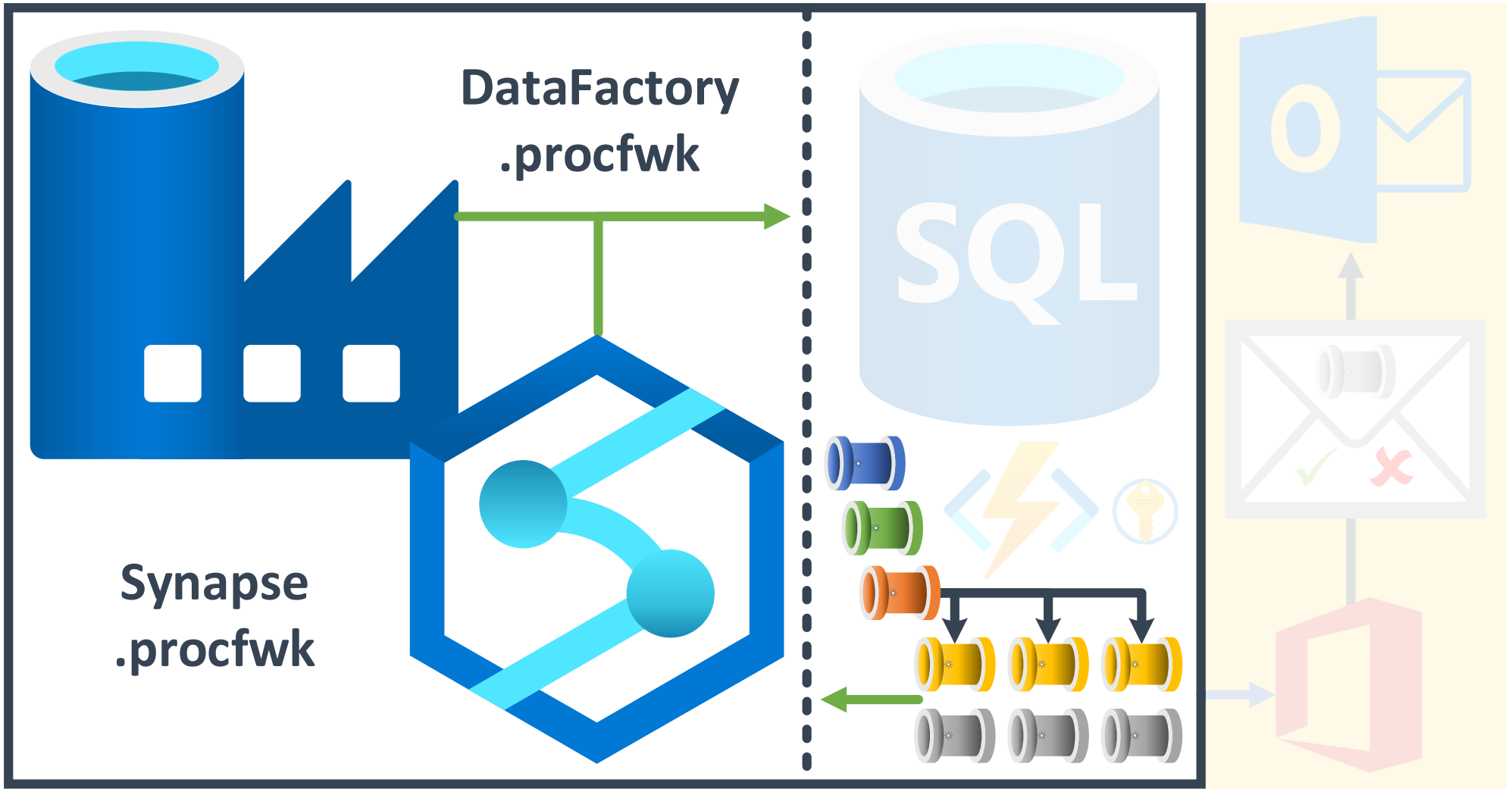

DataFactory
.procfwk
SQL
Synapse
.procfwk

Functions Creation & Configuration



procfwk Functions




DataFactory
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SQL
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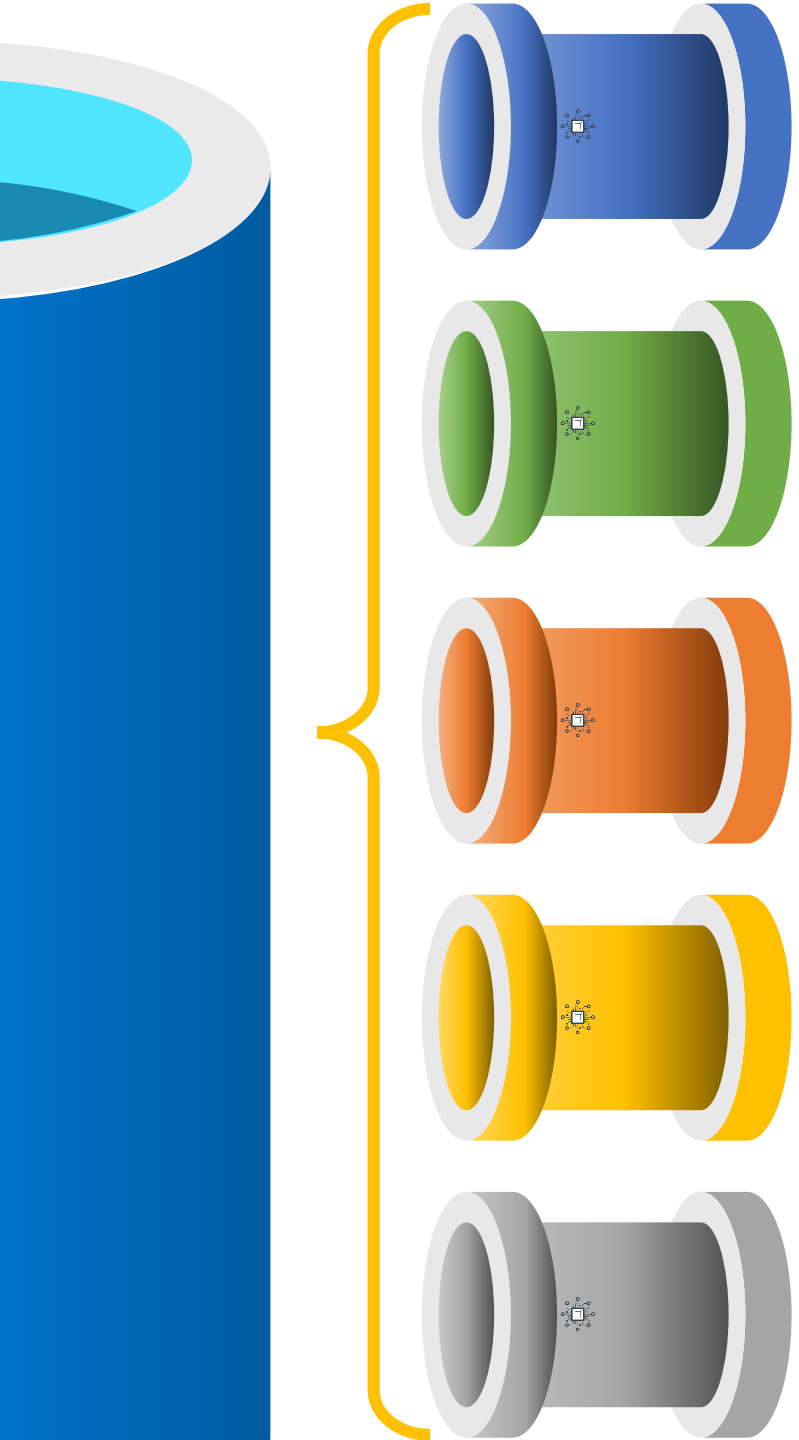
Framework Pipeline Hierarchy



- Grandparent

Role: Optional level platform setup, for example, scale up/out compute services ready for the framework to run.

- Parent

Role: Execution run wrapper for batches and execution stage iterator.

- Child

Role: Scale out triggering of worker pipelines within the execution stage(s).

- Infant

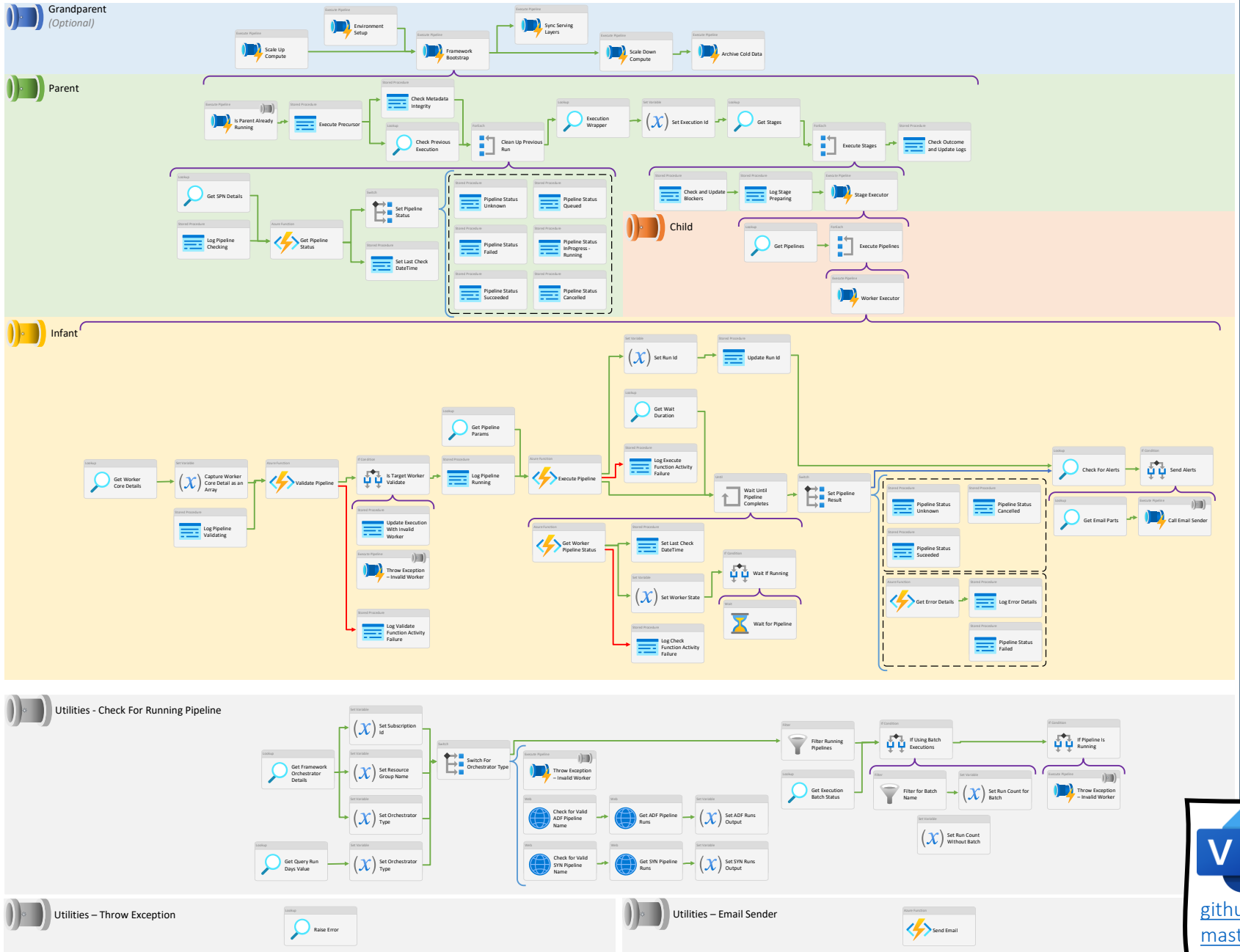
Role: Worker validator, executor, monitor and reporting of the outcome for the single worker pipeline.

- Worker

Role: Anything specific to the process needing to be performed.

Processing Framework - Activity Chain

Orchestration Framework



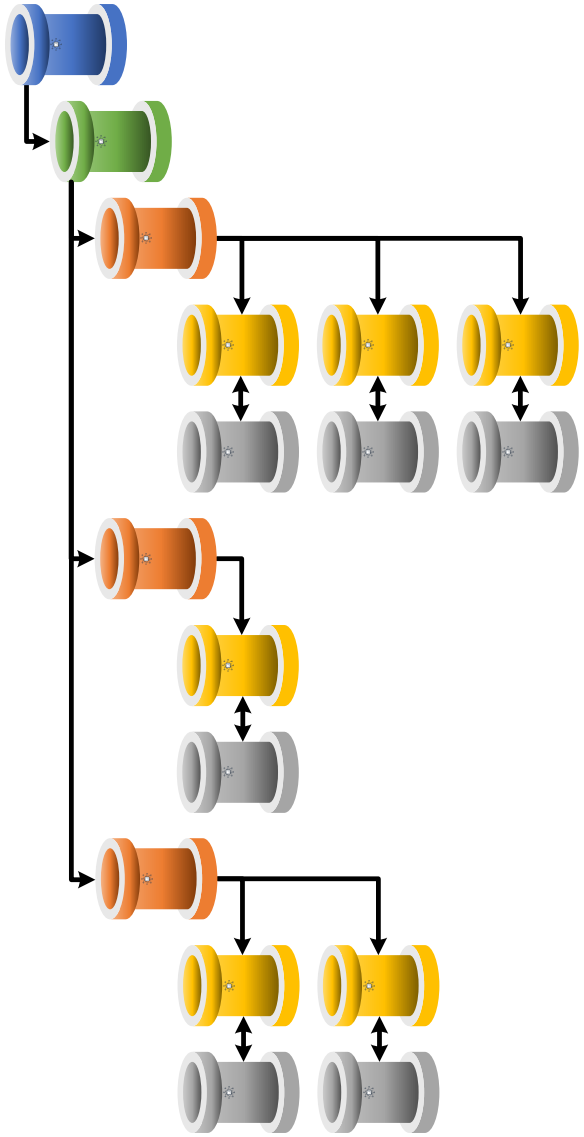
Worker Pipelines

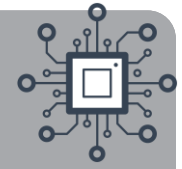
- Worker 1 - Extract
- Worker 2 - Clean
- Worker 3 - Transform
- Worker 4 - Load
- Worker 5 - Serve
- Worker n - .....

Go to Visio file in GitHub:

github.com/mrpaulandrew/procfwk/blob/master/Images


DEMO





Thank you for listening…

Paul Andrew

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YouTube: c/mrpaulandrew
Email: paul@mrpaulandrew.com

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LinkedIn: In/mrpaulandrew

GitHub: github.com/mrpaulandrew