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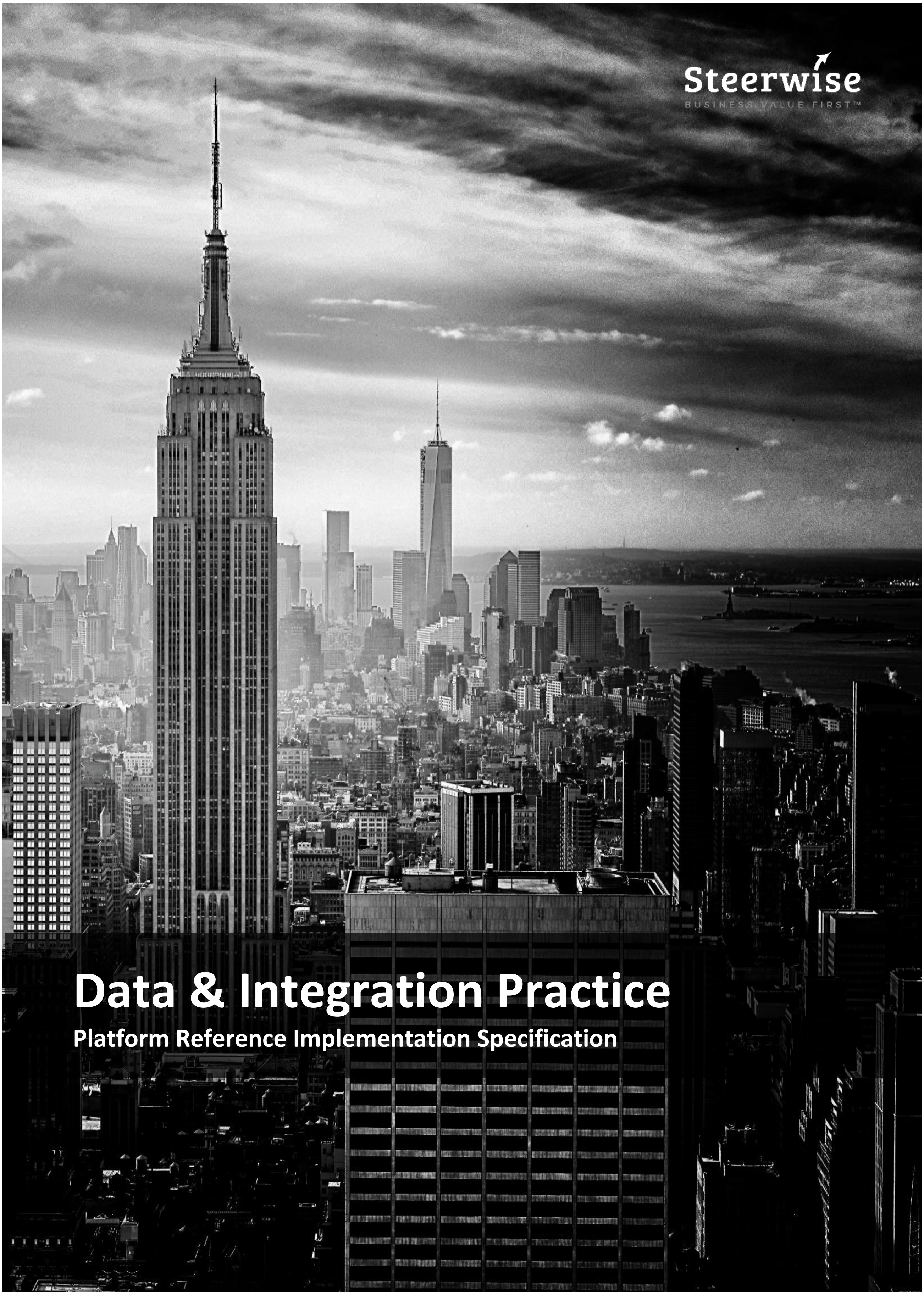

Data & Integration Practice

Platform Reference Implementation Specification

Enterprise Data Platform

Reference Implementation - Proof of Concept (POC)

POC Scope, Use Cases, Milestones, Deliverables & Acceptance Criteria

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1.0 Reference Implementation

1.1 Reference Implementation Goal & Platform Options

1.1.1 Reference Implementation Goal

The goal of Enterprise Data Platform (EDP) Reference Implementation is to:

- recommend specific architecture patterns & technology platform options through proof-of-concept exercise, if necessary
- finalize blueprint & footprint architecture of Enterprise Data Platform (EDP)
- verify that the architecture is implementable
- build key reusable foundational components for next phases

1.1.2 Data Format Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.

Data Format Options:

1. **CSV**
2. **JSON**
3. **Avro**

1.1.3 Data Storage Platform Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.

Raw Data Store Options:

4. **Distributed File System (e.g. HDFS)**
5. **Object Store**
6. **Kafka**
7. **Distributed File System for Hot Storage Tier & Object Store for Everything Else**

Harmonized Data Store Options:

1. **Document Database**
2. **Column-Family Database**

Materialized Data Store Options:

1. **Document Database**
2. **Column-Family Database**
3. **Search Database**

1.1.4 Data Processing Platform Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.

Data Ingression Services Platform Options:

1. **Spark**
2. **Informatica Big Data Management**
3. **Cloud Function (e.g. OpenWhisk)**
4. **Hadoop**

Data Harmonization Services Platform Options:

1. **Spark**
2. **Informatica Big Data Management**
3. **Cloud Function (e.g. OpenWhisk)**
4. **Hadoop**

Data Materialization Services Platform Options:

1. **Spark**
2. **Informatica Big Data Management**
3. **Cloud Function (e.g. OpenWhisk)**
4. **Hadoop**

Data Egression Services Platform Options:

1. **Spark**
2. **Informatica Big Data Management**
3. **Cloud Function (e.g. OpenWhisk)**
4. **Hadoop**

1.1.5 Data Access & Delivery Platform Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.

Data Access & Delivery Services Platform Options:

1. **TIBCO BusinessWorks**
2. **Shareplex (CDC)**
3. **Informatica Power Exchange (CDC)**
4. **Informatica Power Center RT Edition**
5. **Informatica Power Center**
6. **IBM Sterling B2B Integrator**
7. **IBM API Connect**
8. **IBM z/OS Connect**
9. **Kafka**

API Management Platform Options:

1. **3Scale**
2. **Apigee**
3. **Axway API Gateway**
4. **Mashery**
5. **IBM API Gateway**
6. **WSO2**

1.1.6 Deployment & Platform Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.

Deployment Options:

1. **Public Cloud**
2. **Hybrid Cloud**
3. **Private Cloud**
4. **On-Premise Cloud**
5. **Traditional On-Premise**

Cloud Vendor Options:

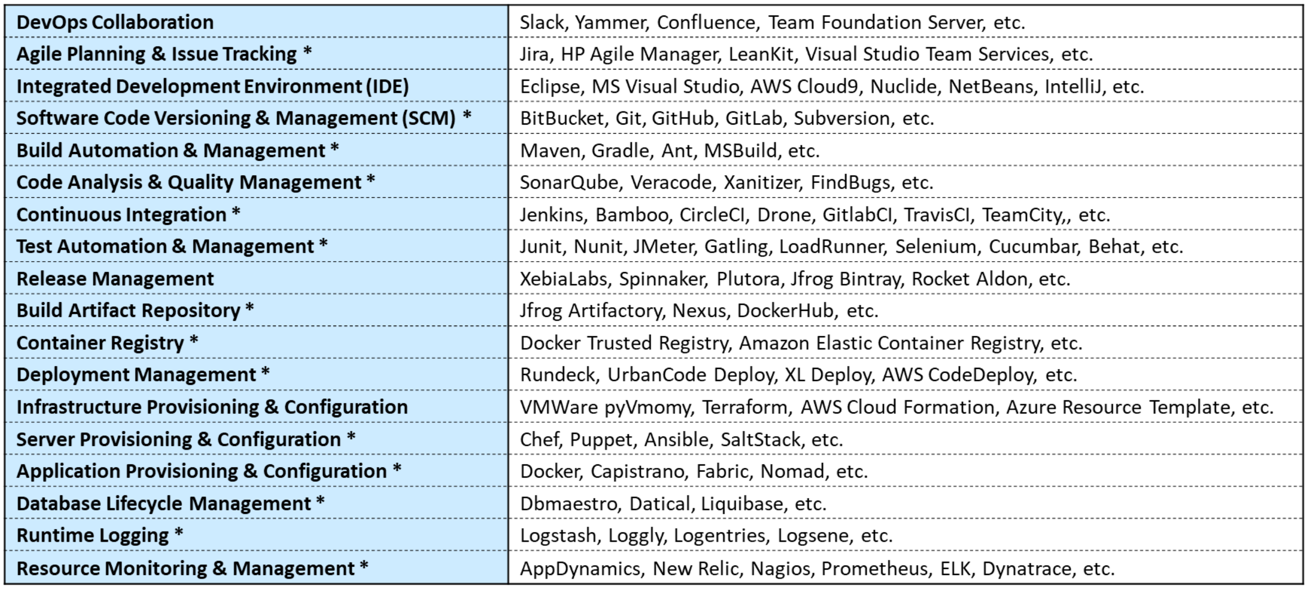
1. **Amazon Web Services**
2. **Microsoft Azure**
3. **IBM Cloud**
4. **IBM zCloud**

Container Options:

1. **Kubernetes**
2. **Docker**

1.1.7 DevOps Tool Chain Options

Identify relevant options in addition to what has been listed below in each of the areas and provide recommendation through proof-of-concept implementation of reusable components, if necessary.



DevOps Collaboration	Slack, Yammer, Confluence, Team Foundation Server, etc.
Agile Planning & Issue Tracking *	Jira, HP Agile Manager, LeanKit, Visual Studio Team Services, etc.
Integrated Development Environment (IDE)	Eclipse, MS Visual Studio, AWS Cloud9, Nuclide, NetBeans, IntelliJ, etc.
Software Code Versioning & Management (SCM) *	BitBucket, Git, GitHub, GitLab, Subversion, etc.
Build Automation & Management *	Maven, Gradle, Ant, MSBuild, etc.
Code Analysis & Quality Management *	SonarQube, Veracode, Xanitizer, FindBugs, etc.
Continuous Integration *	Jenkins, Bamboo, CircleCI, Drone, GitlabCI, TravisCI, TeamCity,, etc.
Test Automation & Management *	Junit, Nunit, JMeter, Gatling, LoadRunner, Selenium, Cucumbar, Behat, etc.
Release Management	XebiaLabs, Spinnaker, Plutora, Jfrog Bintray, Rocket Aldon, etc.
Build Artifact Repository *	Jfrog Artifactory, Nexus, DockerHub, etc.
Container Registry *	Docker Trusted Registry, Amazon Elastic Container Registry, etc.
Deployment Management *	Rundeck, UrbanCode Deploy, XL Deploy, AWS CodeDeploy, etc.
Infrastructure Provisioning & Configuration	VMWare pyVmomy, Terraform, AWS Cloud Formation, Azure Resource Template, etc.
Server Provisioning & Configuration *	Chef, Puppet, Ansible, SaltStack, etc.
Application Provisioning & Configuration *	Docker, Capistrano, Fabric, Nomad, etc.
Database Lifecycle Management *	Dbmaestro, Datical, Liquibase, etc.
Runtime Logging *	Logstash, Loggly, Logentries, Logsene, etc.
Resource Monitoring & Management *	AppDynamics, New Relic, Nagios, Prometheus, ELK, Dynatrace, etc.

1.2 Reference Implementation Requirements

1.2.1 Reference Implementation Proof-of-Concept Goals

1.2.2 Reference Implementation Proof-of-Concept Use Cases

Use Case 1: Build Pass-Through Services

- Identify technology platform, tool & implementation pattern options and provide recommendations and rationale for those recommendations by comparing & contrasting the options
- Finalize technology platform choices and identify the options for POC
- Provide detailed cost estimation calculator for each of the cloud component options as well as an integrated calculator based on the technology options chosen
- Provide availability & disaster recovery specific details of each of the cloud component options
- Setup & configure the development environment with the chosen technology platform choices
- For each technology option that requires POC, design, build, assemble & configure the layers (i.e. access, ingression, harmonization, materialization, egression, & delivery) of Enterprise Data Platform (EDP) as identified by the reference architecture
- Create the data model with sample attributes of Contract & Account concepts
- Build pass-through microservices for each of the layers
- Build the reconciliation microservice to compare & verify that the input data matches with the output data
- Build an automated acceptance test cases with test data using cucumber (or similar tool) to test each of the microservices
- Build continuous delivery pipeline with automation of critical SDLC steps
- Create an EBCDIC encoded fixed-length file with hand-created sample data
- Run the sample file through the Enterprise Data Platform (EDP) and verify the output against the input
- Rewind & re-compute the already ingested sample file and verify the output against the input

Use Case 2: Enable Security & Metadata Services

- Design & build in-transit, at-rest & in-use encryption using format preserving encryption techniques
- Design & build data discovery functions to identify technical metadata stored within the platform
- Design & build end-to-end data lineage within Enterprise Data Platform (EDP)
- Showcase the security & metadata functionalities through Platform UI or execution of manual scripts or automated test cases

Use Case 3: Build Mainframe Connectivity Services

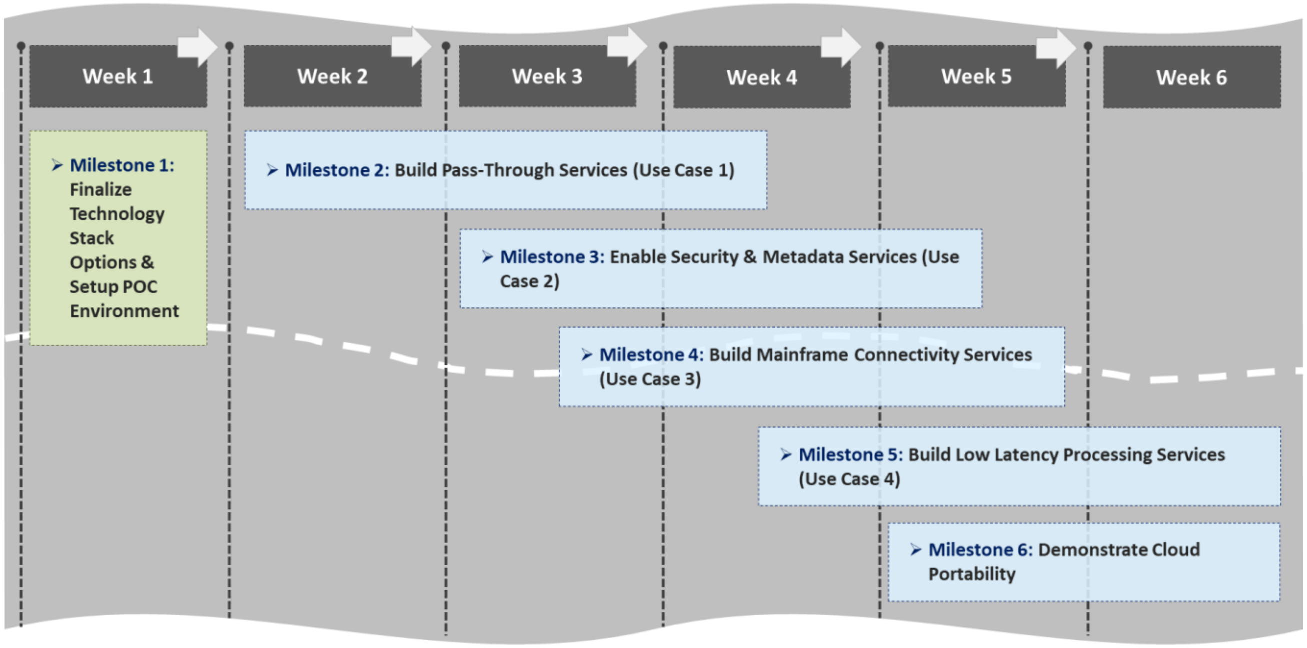
- Enable Change Data Capture (CDC) on mainframe to capture changes in near real-time on selected entities
- Build a mockup web app replacing a specific mainframe screen
- Utilize z/OS Connect & create an API to interact with the mainframe
- Integrate the web app with mainframe API through Enterprise Data Platform (EDP)
- Showcase the mainframe connectivity services through the execution of manual scripts or automated test cases or web UI

Use Case 4: Build Low Latency Processing Services

- Identify TFS specific integration interfaces for proof-of-concept scope
- Design & modify the data model to prove out the data model evolution scenario
- Redesign & re-build the ingression, harmonization, materialization & egression microservices with moderate to heavy computation logic
- Ingest a file containing few million records and execute the data pipeline
- Rewind & replay a set of files containing few million records each to observe the latency characteristics
- Measure & showcase the performance & scalability of the platform for each of the scenarios & components

1.2.3 Reference Implementation Proof-of-Concept Milestones

The critical milestones and proposed duration for the Reference Implementation Proof-of-Concept is depicted below. It is critical that we complete Milestone 1 first and that TFS understand the schedule for subsequent milestones in advance so that we can plan resource availability accordingly. Incremental deliveries throughout the POC period are preferred to avoid TFS resource contention.


Week 1
Week 2
Week 3
Week 4
Week 5
Week 6
Milestone 1: Finalize Technology Stack Options & Setup POC Environment
Milestone 2: Build Pass-Through Services (Use Case 1)
Milestone 3: Enable Security & Metadata Services (Use Case 2)
Milestone 4: Build Mainframe Connectivity Services (Use Case 3)
Milestone 5: Build Low Latency Processing Services (Use Case 4)
Milestone 6: Demonstrate Cloud Portability

Milestone 1: Finalize Technology Stack Options & Setup POC Environment

Milestone 1 - Step Point 1:

Step Point Description

Identify all applicable options & choices of technology platforms, tools & technology related functional & non-functional characteristics & implementation specific patterns for all layers & components of Enterprise Data Platform (EDP) Reference Architecture

Vendor Activities & Deliverables

1. Vendor to provide a list of most relevant vendor agnostic & vendor specific options of technology platforms, tools & implementation patterns for each of the Enterprise Data Platform (EDP) Reference Architecture components
2. Vendor to provide concise descriptions of technology related functional & non-functional (including portability, security, scalability, performance, high availability, disaster recovery, configurability, scheduling, management/monitoring/alerting/support, etc.) characteristics for each of the option
3. Vendor to collaborate with TFS to receive additional technology options related inputs & suggestions

TFS Activities & Deliverables

1. TFS to provide initial reference list of technology platforms & tools options
2. TFS to participate in vendor collaboration sessions to provide additional technology options related inputs & suggestions

Acceptance Criteria

1. It is necessary that a comprehensive list of most relevant vendor agnostic & vendor specific platform options with clear & concise descriptions of functional & non-functional characteristics & patterns of each layer & component of Enterprise Data Platform (EDP) Reference Architecture is neatly documented & presented

Milestone 1 - Step Point 2:

Step Point Description

Provide recommendations and the corresponding rationale by comparing & contrasting the options of technology platforms, tools & implementation patterns comprehensively

Vendor Activities & Deliverables

1. Vendor to provide a comparison sheet with pros & cons for each of the technology option choices specific to implementation patterns & usage context (i.e. when to use what) for each of the layer & component of Enterprise Data Platform (EDP) Reference Architecture
2. Vendor to provide set of recommendations for each of the technology option choices specific to implementation patterns for each of the layer & component of Enterprise Data Platform (EDP) Reference Architecture
3. Vendor to provide a clear & concise rationale for each of the recommendation with data, metrics or evidence to support the choices and recommendations
4. Vendor to collaborate with TFS to receive additional technology recommendations related inputs & suggestions

TFS Activities & Deliverables

1. TFS to participate in vendor collaboration sessions to provide additional technology recommendations related inputs & suggestions

Acceptance Criteria

1. It is necessary that a clear & concise descriptions of usage context & pattern specific comparisons, pros & cons, recommendations and the corresponding rationale for each of the layer & component of Enterprise Data Platform (EDP) Reference Architecture is neatly documented & presented

Milestone 1 - Step Point 3:

Step Point Description

Finalize technology platform, tool & implementation pattern choices and identify the options requiring Proof-of-Concept (POC)

Vendor Activities & Deliverables

1. Vendor to collaborate with TFS to finalize the technology platform, tool & implementation pattern choices and identify the options requiring POC for each of the layer & component of Enterprise Data Platform (EDP) Reference Architecture
2. Vendor to document the finalized list of choices along with options requiring POC

TFS Activities & Deliverables

1. TFS to participate in vendor collaboration sessions to finalize the technology platform, tool & implementation pattern choices and identify the options requiring POC

Acceptance Criteria

1. It is necessary that a clear & concise list of finalized choices of technology platforms, tools & implementation patterns along with options requiring POC for each of the layer & component of Enterprise Data Platform (EDP) Reference Architecture is neatly documented & presented

Milestone 1 - Step Point 4:

Step Point Description

Provide a cost estimation calculator for each of the technology component option as well as an integrated calculator at the solution-level based on the chosen technology options and vendor platforms

Vendor Activities & Deliverables

1. Vendor to provide a cost estimation calculator tool with input-able cost parameters & variables for each of the technology component options for TFS use
2. Vendor to provide an overall solution-level integrated cost estimation calculator tool with input-able cost parameters & variables for TFS use
3. Vendor to provide the cost estimation calculator for both initial setup costs (if any) and ongoing operation of the platform
4. Vendor to collaborate with TFS to receive cost estimation calculator related inputs & suggestions

TFS Activities & Deliverables

1. TFS to participate in vendor collaboration sessions to provide cost estimation calculator related inputs & suggestions

Acceptance Criteria

1. It is necessary that a TFS input-able cost estimation calculator tool with cost parameters & variables at the individual technology component level as well as at the integrated solution-level is delivered

Milestone 1 - Step Point 5:

Step Point Description

Prepare, setup & configure the POC environment with the selected technology platform & tool choices

Vendor Activities & Deliverables

1. Vendor to prepare, setup & configure the POC environment with the selected technology platform & tool choices on infrastructure to be setup and provided by the vendor
2. Vendor to provide extensible infrastructure-as-code for POC environment, across technology stack and layers
3. Vendor to provide access to technology components for TFS team members to review, validate & verify vendor developed POC specific artifacts & deliverables

TFS Activities & Deliverables

1. TFS to provide list of people that would need access to the POC environment and resources
2. TFS to verify access to POC environment and the deliverable content
3. TFS to verify & validate infrastructure-as-code for POC environment

Acceptance Criteria

1. It is necessary that TFS team members have access to POC environment that is setup & configured in vendor’s environment with technology platform & tool choices in order to validate & verify the deliverable content
2. It is necessary that the POC environment setup, configuration & the corresponding infrastructure-as-code & scripts are reusable & extensible for multi-environment deployments
3. It is necessary that a clear, consistent & easily repeatable instructions for setup of each of the technology components across various environments are provided

Milestone 2: Build Pass-Through Services (Use Case 1)

Milestone 2 - Step Point 1:

Step Point Description

Create the physical data model based on the chosen database platforms for Contract & Account concepts with sample attributes

Vendor Activities & Deliverables

1. Vendor to create the physical data model based on the chosen database platforms for Contract & Account concepts with sample attributes
2. Vendor to collaborate with TFS to finalize the physical data model

TFS Activities & Deliverables

1. TFS to provide the sample attributes of Contract & Account concepts to the Vendor

Acceptance Criteria

1. It is necessary that physical data model is complete & verified by TFS

Milestone 2 - Step Point 2:

Step Point Description

Create the required microservices for each layer of Enterprise Data Platform (EDP) to support and deliver the pass-through functionality

Vendor Activities & Deliverables

1. Vendor to provide implementation choices & patterns of microservices, across all layers of Reference Architecture
2. Vendor to collaborate with TFS to review the choices and how it meets solution needs and receive inputs
3. Vendor to implement at least one or more microservices along with unit test cases across each of the Reference Architecture layers, to deliver the pass-through functionality where the data must flow through each of the microservices
4. Vendor to provide a skeleton or template code for developing new microservices for each of the layers
5. Vendor to provide access to all the microservices code in the code repository
6. Vendor to provide the implemented microservices across all the layers for the pass-through functionality, deployed and working solution on the POC environment and platform
7. Vendor to demonstrate the microservices on the POC environment and platform
8. Vendor to provide CI (Continuous Integration) and CD (continuous deployment) scripts and instructions to test, deploy and run the developed microservices

TFS Activities & Deliverables

1. TFS to review microservices design and give feedback
2. TFS to review the skeleton and or template code for developing the microservices and give feedback
3. TFS to access and review microservices code and give feedback
4. TFS to access the CI/CD code for testing, deploying and running the microservices

Acceptance Criteria

1. It is necessary that the microservices implementation design, template code, access to code repository is provided to & reviewed by TFS, and the feedback is incorporated
2. It is necessary that the microservices are deployed in the POC environment, unit test cases are run and the functionality of each microservice is demonstrated
3. It is necessary that the CI (continuous integration) and CD (continuous deployment) code for testing, deploying and running are complete

Milestone 2 - Step Point 3:

Step Point Description

Create reconciliation microservice that verifies the ingressed dataset matches with the egressed dataset to demonstrate the pass-through functionalities of the Enterprise Data Platform (EDP)

Vendor Activities & Deliverables

1. Vendor to provide the reconciliation microservice implementation design and source code access
2. Vendor to build, deploy and run the reconciliation service on the POC environment
3. Vendor to review the implementation design of the reconciliation service with TFS
4. Vendor to provision and configure the reconciliation service to auto execute the validation for each of the files being ingested at the input data access layer and the output generated at the data delivery layer

TFS Activities & Deliverables

1. TFS to review the implementation design and give input for the reconciliation service
2. TFS to review the source code for the reconciliation service
3. TFS to review the reconciliation service output

Acceptance Criteria

1. It is necessary that the reconciliation microservice must be deployed and auto executed for each of the input files and all output files must be successfully validated to be having the same size, number of records, match the records and the checksum of the files

Milestone 2 - Step Point 4:

Step Point Description

Create, provision and configure the data access layer for each of the data ingression patterns, Bulk-Batch Acquisition and Bulk-Batch Reception, mentioned in the reference architecture, mainly for the EBCDIC encoded fixed-length batch file input

Vendor Activities & Deliverables

1. Vendor to provide the configurability options for the data access layer
2. Vendor to work with TFS for reviewing the choices and implementation choices
3. Vendor to instantiate, configure and operate the data access layer in the POC environment
4. Vendor to provide access to any custom developed components source code and make this part of the CI/CD pipeline along with automated test cases
5. Vendor to provide access to all configuration of the data access layer, as infrastructure code and enable it as part of the CI/CD pipeline

TFS Activities & Deliverables

1. TFS to review the implementation design, any custom code and configuration files and provide input

Acceptance Criteria

1. Deployment of the data access layer for Bulk-Batch Acquisition and Bulk-Batch Reception of multiple concurrent EBCDIC encoded fixed-length batch files
2. Deployment, provisioning or configuration of the service must be part of the CI/CD pipeline

Milestone 2 - Step Point 5:

Step Point Description

Create EBCDIC encoded fixed-length files , for a given set of parameters, with a configurable number (millions) of distinct records in each file

Vendor Activities & Deliverables

1. Vendor to provide EBCDIC encoded fixed-length files for a given set of parameters

TFS Activities & Deliverables

1. TFS to provide parameters and meta information about the parameters and format of the file to be generated
2. TFS to review the copybook and sample data files

Acceptance Criteria

1. EBCDIC encoded fixed length files for a given set of parameters containing unique records must be provided
2. Files must have a different data set for every invocation across all invocations
3. Every record in the files must have unique identifiers and variations in data across fields

Milestone 2 - Step Point 6:

Step Point Description

Configure, deploy and showcase the DevOps (CI/CD) automated pipeline, used for all assets and working of the POC, for critical SDLC steps, mainly (source repository, build, all phases of automated testing, release and deployment)

Vendor Activities & Deliverables

1. Vendor to provide documentation and presentations with a clear and complete strategy, design for an integrated DevOps and CI & CD toolchain
2. Vendor to provide the implementation and configuration of the critical SDLC and DevOps steps (Source Repository, Build, Automated Testing and Automated Deployment)
3. Vendor to collaborate and review the DevOps methodology, and integrated toolchain with TFS
4. Vendor to provide instructions and demonstrate how to use and operate the CI/CD automated pipeline used for the POC

TFS Activities & Deliverables

1. TFS to review the strategy provided by vendor for DevOps and provide feed back
2. TFS to review instructions, documentation and vendor demo (or optionally operate) the CI/CD tools and pipeline setup for the POC
3. TFS to review and view vendor demo (or optionally operate) the execution of automated test cases
4. TFS to review and view vendor demo (or optionally operate) the automated deployment of the releases for the POC cloud platform

Acceptance Criteria

1. Complete strategy and integrated tool set recommendation must be provided
2. Implementation and deployment of the integrated tool set for the critical SDLC steps (source repository, automated builds, automated test execution for all phases and automated deployment for both testing and deployment) must be provided
3. Vendor walk-through of the CI/CD automated pipeline for all artifacts of the POC solution

Milestone 2 - Step Point 7:

Step Point Description

Create automated acceptance test cases with test data using cucumber (or other agreed upon) test framework or tool for each of the microservices and the solution, and showcase automated execution capabilities and validation of the tests

Vendor Activities & Deliverables

1. Vendor to provide a framework for documentation and writing test cases that can be auto executed along with test data against the target platform
2. Vendor to collaborate with TFS to review and finalize the auto acceptance test framework and tools
3. Vendor to provide an applicable set of test cases documented and written in the selected framework covering all microservices
4. Vendor to collaborate with TFS to review and finalize the test cases and coverage
5. Vendor to showcase the auto execution of the acceptance test cases against the target environment on change of any artifact in the CI/CD pipeline

TFS Activities & Deliverables

1. TFS to review the automated acceptance test cases framework and tools and finalize the choice
2. TFS to review the acceptance test cases provided and check for validity and coverage and give input

Acceptance Criteria

1. Agreed upon and implemented acceptance test cases must all be automatically executed for every change of artifacts in the CI/CD pipeline
2. All the acceptance test cases must have ability to be manually triggered to be run as needed
3. All acceptance test cases must contain test data (vs. manual input upon execution)

Milestone 2 - Step Point 8:

Step Point Description

Trigger execution of the data access services for the batch file and input the sample EBCDIC encoded data through the Enterprise Data Platform (EDP) and successfully validate the output EBCDIC file against the input

Vendor Activities & Deliverables

1. Vendor to use test data files previously generated and approved within the POC
2. Vendor to provide one of the generated test data files as input to the data access services and be processed by the various microservices of the Enterprise Data Platform (EDP)
3. Vendor to verify and demonstrate the processing, storage of all data across the various layers and components of the platform
4. Vendor to verify and demonstrate the generated output file is valid
5. Vendor to demonstrate and show the validation of the file by the reconciliation service
6. Vendor to provide documentation and instructions to operate and input the files and verify them to TFS

TFS Activities & Deliverables

1. TFS to review and participate in the vendor demonstration
2. TFS to review and optionally operate the platform, input files and verify independently

Acceptance Criteria

1. Enterprise Data Platform (EDP) must be deployed, configured and operable
2. Multiple test input data files, must be input into the input data access layer as needed and the output file generated on the output data access layer must be successfully validated, manually and also by the reconciliation service
3. POC platform documentation must be sufficient to be operable by TFS

Milestone 2 - Step Point 9:

Step Point Description

Trigger execution of the data access layer for the batch file that contains 1M, 3M, 5M and 10M records per file and successfully output files and provide performance metrics and insights and also demonstrate scalability of the platform

Vendor Activities & Deliverables

1. Vendor to generate test data files for 1M, 3M, 5M and 10M records per file
2. Vendor to provide a set of metrics, and performance / scalability parameters that need to be evaluated
3. Vendor to execute input of test data files and validate the output
4. Vendor to provide performance metrics for all components of the Enterprise Data Platform (EDP)
5. Vendor to provide insights to the strengths and bottlenecks in performance and showcase auto scaling to handle higher throughput with lower latency
6. Vendor to collaborate with TFS to review and provide solutions or alternatives to resolve the issues found

TFS Activities & Deliverables

1. TFS to review and provide input on the provided metrics and performance / scalability parameters
2. TFS to review the captured metrics and insights with vendor
3. TFS to collaborate and review the proposed solutions and alternatives for issues found during testing

Acceptance Criteria

1. Large data set input files must be input and executed on the POC platform and all files must be successfully validated
2. Performance metrics and insights, that are reviewed and agreed upon must be provided

Milestone 2 - Step Point 10:

Step Point Description

Provision and configure the data access layer to ingest an already ingested test data file from the Raw Data Store and verify the output against the original input file (outside the Raw Data Store)

Vendor Activities & Deliverables

1. Vendor should be able to provision the data access layer to re-ingest a previously input file from the raw data store
2. Vendor must validate the output file against the original data file which was used during the initial input
3. Vendor must provide the ability to repeat the above tests as needed multiple times
4. Vendor to provide the documentation and instructions for TFS to execute and validate this test

TFS Activities & Deliverables

1. TFS to collaborate with vendor to view demo or optionally run the tests multiple times and validate the output

Acceptance Criteria

1. Output file validation must be successful for the same file every time and same file is input and replayed from the raw data store

Milestone 2 - Step Point 11:

Step Point Description

Deploy POC solution and all tools and components, using the continuous delivery code, instantiated and run into a different environment than the initial POC environment (i.e. from dev to test) with minimal or no changes to the solution, data and CI/CD infrastructure and code

Vendor Activities & Deliverables

1. Vendor need to be able to promote and run the complete POC solution, tools and components across two different environments with minimal or no changes to the deployment code
2. Vendor need to showcase and demo a working system via acceptance test on two different deployment environments

TFS Activities & Deliverables

1. TFS to verify and participate in the vendor demonstration

Acceptance Criteria

1. It is necessary that the working POC solution should be portable, deployable and executing on a different deployment environment than the initial POC environment

Milestone 3: Enable Security & Metadata Services (Use Case 2)

Milestone 3 - Step Point 1:

Step Point Description

Enterprise Data Platform (EDP) to provide encryption of data in-transit and at-rest, and using Format Preserving Encryption (FPE) techniques for data in-use

Vendor Activities & Deliverables

1. Vendor to encrypt selected data element using FPE at the data source
2. Vendor to implement a centralized stateless key management service for FPEs
3. Vendor to implement logic to utilize encrypted fields in one or more microservices by decrypting at processing time
4. Vendor to implement encryption of data at-rest across all layers of storage tiers
5. Vendor to implement encryption of data in-transit across all communication channels
6. Vendor to configure & enable out-of-the-box authentication, authorization & auditing functionalities

TFS Activities & Deliverables

1. TFS to identify & provide the data element(s) that need to be encrypted using FPE
2. TFS to review the encryption implementation and provide feedback

Acceptance Criteria

1. It is necessary to demonstrate end-to-end encryption of sensitive data on the Enterprise Data Platform (EDP) and FPE for data in-use
2. It is necessary to demonstrate out-of-the-box authentication, authorization & auditing capabilities of technology platform components

Milestone 3 - Step Point 2:

Step Point Description

Implement a metadata management function to demonstrate data discovery of technical metadata stored within the platform

Vendor Activities & Deliverables

1. Vendor to provide a clear and concise and functional documentation of a metadata management function for data discovery and catalog of technical metadata across the platform
2. Vendor to collaborate with TFS on the implementation of technical metadata discovery
3. Vendor to implement, deploy and showcase metadata management and data discovery functionalities through platform UI or manual execution of scripts

TFS Activities & Deliverables

1. TFS to review and provide feedback into the implementation of metadata management functionality for data discovery of technical metadata across the platform

Acceptance Criteria

1. It is necessary to demonstrate the functionality of technical metadata discovery across the platform

Milestone 3 - Step Point 3:

Step Point Description

Implement a metadata management function to demonstrate end-to-end data lineage within the Enterprise Data Platform (EDP)

Vendor Activities & Deliverables

1. Vendor to provide a clear and concise documentation of a metadata management function for end-to-end data lineage to understand the data flow within the Enterprise Data Platform (EDP)
2. Vendor to collaborate with TFS on the implementation of end-to-end data lineage functionality
3. Vendor to implement, deploy and showcase metadata management and data lineage functionalities through platform UI or manual execution of scripts

TFS Activities & Deliverables

1. TFS to review, validate, and provide feedback into the implementation of metadata management functionality for end-to-end data lineage within the Enterprise Data Platform (EDP)

Acceptance Criteria

1. It is necessary to demonstrate the metadata management functionality of end-to-end data lineage within the Enterprise Data Platform (EDP)

Milestone 4: Build Mainframe Connectivity Services (Use Case 3)

Milestone 4 - Step Point 1:

Step Point Description

Create API gateway, using z/OS Connect, and demonstrate interaction with the mainframe legacy applications

Vendor Activities & Deliverables

1. Vendor to setup and configure the z/OS Connect API Gateway & mainframe system with IMS, DB2 & VSAM in the vendor environment for POC purposes
2. Vendor to implement a mock application on the mainframe exposing an API and applying CRUD operations to IMS, VSAM and DB2 with the data model previously used in the POC
3. Vendor to implement and deploy a mock web application that has a demonstrable minimal functional interface, taking in parameters and calls the mock application API on mainframe via z/OS connect API gateway
4. Vendor to provide the connectivity between the mainframe POC environment and the Enterprise Data Platform (EDP) POC environment
5. Vendor to demonstrate end-to-end working of the implemented web application, z/OS API Gateway and successful calls to the mainframe functionality with data being updated in the IMS, VSAM and DB2

TFS Activities & Deliverables

1. TFS to provide reference screen for the mock web applications and API Contract
2. TTFS to review and validate the demonstration of the interaction between the web application and mainframe data sources

Acceptance Criteria

1. It is necessary to successfully demonstrate API calls from the web application to the mainframe application via z/OS connect API gateway and data updates on IMS, VSAM and DB2

Milestone 4 - Step Point 2:

Step Point Description

Enable CDC on mainframe, for IMS, VSAM and DB2, and capture changes, in near real-time, propagate and integrate the CDC records with data in the Enterprise Data Platform (EDP)

Vendor Activities & Deliverables

1. Vendor to configure and enable CDC on the mainframe for IMS, VSAM, and DB2 data sources
2. Vendor to enable and configure input data access layer for CDC in the POC environment
3. Vendor to implement microservices to process CDC events & integrate data within the Enterprise Data Platform (EDP)
4. Vendor to implement a materialization layer microservice and generate a file with the harmonized data integrating the CDC records

TFS Activities & Deliverables

1. TFS to provide CDC related data elements to be integrated
2. TTFS to review and validate the demonstration of the CDC process integrating into the Enterprise Data Platform (EDP)

Acceptance Criteria

1. It is necessary to demonstrate successful capturing of CDC events from IMS, VSAM and DB2 data sources, on mainframe, propagating the CDC records and integrating with the data in the Enterprise Data Platform (EDP) and generating the integrated data output file

Milestone 5: Build Low Latency Processing Services (Use Case 4)

Milestone 5 - Step Point 1:

Step Point Description

Introduce changes to the physical data model & data processing microservices for Contract & Account concepts based on the additional sample attributes & structural logic to prove out the functional evolution scenario

Vendor Activities & Deliverables

1. Vendor to introduce changes to the physical data model based on the chosen database platforms for Contract & Account concepts with the additional sample attributes
2. Vendor to collaborate with TFS to finalize the modified physical data model
3. Vendor to introduce changes to the microservices based on the structural logic changes

TFS Activities & Deliverables

1. TFS to provide the additional sample attributes of Contract & Account concepts to the Vendor to introduce changes to the physical data model
2. TTFS to validate updated data model and updated microservices

Acceptance Criteria

1. It is necessary to prove that the physical data model & the microservices are flexible, supporting agility when changes are introduced

Milestone 5 - Step Point 2:

Step Point Description

Implement moderate to heavy computation logic across ingression, harmonization, materialization and egression microservices, to observe and verify performance & scalability characteristics under various workloads

Vendor Activities & Deliverables

1. Vendor to redesign & rebuild the microservices across all layers introducing moderate to heavy computation logic
2. Vendor to ingest multiple files containing, 1M, 3M, 5M and 10M records respectively and execute the data pipeline
3. Vendor to capture metrics across all the components, mainly measuring latency at and across all components and services
4. Vendor to rewind and replay the datasets to observe the performance & scalability characteristics, especially latency
5. Vendor to experiment scaling resources as needed to maintain or keep the latency low
6. Vendor to document and publish the various metrics and latency characteristics, effects of resource scaling and steps needed to auto scale resources to maintain latency

TFS Activities & Deliverables

1. TFS to provide input on moderate to heavy computation logic
2. TFS to observe performance testing and review the metrics and latency characteristics report
3. TFS to collaborate with vendor to identify performance tuning opportunities

Acceptance Criteria

1. It is necessary to implement & demonstrate microservices with heavy computation logic
2. It is necessary to run performance tests with various workloads and capture performance & scalability characteristics using well-defined metrics
3. It is necessary to successfully demonstrate auto-scaling to maintain low latency
4. It is necessary to publish clear and comprehensive metrics and the observed characteristics

Milestone 6: Demonstrate Cloud Portability

Milestone 6 - Step Point 1:

Step Point Description

Demonstrate portability of Enterprise Data Platform (EDP) from one cloud provider to another

Vendor Activities & Deliverables

1. Vendor to provide mitigation plans, implement necessary abstractions and pluggable platform components to support cloud portability
2. Vendor to choose the cloud provider of choice & demonstrate that the Enterprise Data Platform (EDP) is portable across cloud platforms

TFS Activities & Deliverables

1. TFS to provide feedback into the implementation of cloud portable Enterprise Data Platform (EDP)

Acceptance Criteria

1. It is necessary to successfully demonstrate that the Enterprise Data Platform (EDP) is portable across cloud platforms with minimal configuration changes