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ADMINISTRATION GUIDE

Synergi Pipeline Assessment Results Service

Application Programming Interface (API)

Version 2

APRIL 2024

DNV - Digital Solutions

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Synergi Pipeline Assessment Results Service API

This Administration Guide provides information for the configuration, and implementation of the Synergi Pipeline Assessment Results Service Application Programming Interface (API). The Assessment Results Service API provides a secure mechanism that makes approved Risk, Analytical, HCA and MCA, and Class Location assessment results available to users who do not have direct access to the reporting database. In addition to approved results, the service also supports the retrieval of calculated results or results not yet approved for Risk, Analytical, and Defect assessments.

The SpiAssessmentResultsService component is a .NET Core microservice that connects and reads results data from Synergi Pipeline's product and reporting databases. It prepares calculational results for download using a REST API.

Instructions for on-premise deployment of the Synergi Pipeline Assessment Results Service API are provided in "Deployment" on page 31 .

For Synergi Pipeline Software as a Service (SaaS) deployments, DNV implements the Synergi Pipeline Assessment Results Service API deployment process for your Synergi Pipeline environment.

For further information about the Synergi Pipeline Assessment Results Service API or to request assistance, contact your DNV Project Manager or DNV - Digital Solutions Technical Support at software.support@dnv.com.

Overview

The Assessment Results Service API does not require Synergi Pipeline software components to operate. It only requires a connection to a known version of the Synergi Pipeline database(s). The service itself allows for synchronous preparation and asynchronous collection of results from Synergi Pipeline's database. The service manages the state of this work through three database tables it creates, which can be resident in either of the four Synergi Pipeline databases or put in an entirely new separate database – including a local SQLite file database – if needed. The tables managed by this service maintain the state of results requests (jobs), which can be collected asynchronously and retained for later download by API consumers.

The service requires three support tables and maintains automated migrations of the three tables during startups. These tables are:

- **AR_JOBS** – Holds one record for each result/job request initiated by consumers of the API.
- **AR_PAYLOADS** – Holds one record for each result/job and payload combination. This is the cache registry of all collected payloads.

- **AR_KEYVALUEPAIRS** – Holds one record for each result/job and payload combination in blocks. Records in this table hold the actual compressed "Collected" results in ready-made export format. Data in this table is in JSON format but compressed. This table is likely to see the most growth depending upon number of jobs, payloads, size of results, and the retention periods desired between the collection and the retrieval of the output payloads.

> **NOTE:** Several administration methods found on the Cleanup controller allow administrators to clean up cached results job information.

Design

The service is designed to scale and perform well given large and complex sets of results resident across several tables in the Synergi Pipeline database. It supports expansion of additional results types to be requested (provided in the future beyond Risk, Analytical, HCA and MCA, and Class Location assessment results), and it allows additional output types as well (provided in the future beyond the initial offering of downloads of JSON payloads). It runs in both Azure and on-premise environments. The service can retrieve large results sets, which take many minutes to generate without having callers wait or timeout while results are being collected. It also provides download of results in manageable payload sizes (which may be too large to send back on a single REST response message).

Due to the potential time necessary to collect some results sets (greater than four minutes in many cases), and also the size of the return record set(s) from the results (greater than one GB and several million records in some cases) – it provides a REST asynchronous pattern. The service contains a default endpoint, which is fully self-documented using online Swagger API documentation and examples. It also contains several API endpoints to support administration (Health Monitor) and management of its results state cache (Cleanup).

Versioning

Along with various improvements and new functionality added to the service, several breaking changes have been introduced to the API. To account for this, the service now implements API versioning through the URI path. The existing REST APIs can continue to be used without any impact or changes. When ready, applications can be migrated to the newer version of the API. When a new version of a REST API exists, assume that there is a breaking change that might require adjustments to the calling application. "Breaking Changes (Version 1 to Version 2)" on page 8 describes these changes and the necessary modifications.

With URI path versioning, the version number is included in the URI path. For example, the results retrieval endpoint can now be referenced with the following:

/api/AssessmentResultsService/results

/api/v1/AssessmentResultsService/results

Both of these endpoints are synonymous with each other. In absence of any version (vX) specification, the default version of the endpoint is used.

There is now a version 2 of the results retrieval endpoint:

/api/v2/AssessmentResultsService/results

Swagger can be used to view the available API versions through the "Select a definition" options menu. Based on the entry selected in the options menu, the controllers and API will be adjusted. For the current release of the service, there are two definitions "Assessment Results API v1" and "Assessment Results API v2".

New Functionality

The latest version of the service contains new functionality.

- Approved Defect assessment results can now be retrieved, in addition to being able to retrieve approved results for Analytical, Class Location, HCA and MCA, and Risk assessments.
- Calculated results for assessments that have not been approved can now be retrieved in a manner similar to approved results. The results available include Analytical, Defect and Risk assessments.
- Results for Defect and Risk assessments can now be filtered by model parts and factors similar to the functionality previously available for approved Analytical assessments. This feature is available for both approved and calculated results.
- Result information helpers have been added for Defect assessments that allow for the retrieval of assessment and model information.
- Result specification helpers have also been added that allow for the retrieval of a results specification given a known model or assessment name. This specification can then be modified as desired before being used in a result request.

API Endpoints (Version 2)

The functionality available for version 2 of the API endpoints can be grouped into the following.

- Authentication
- Results retrieval (both approved and calculated results)
- Assessment and Modeling information lookup
- Administration
- Health monitoring

With URI path versioning, the version number will be included in the URI path. For version 2, the pattern will be {domain}/api/v2.

The service supports four controllers and various REST API endpoints on each:

1. **AssessmentResultsService Controller** — This is the main controller that consumers of the API will interact with to perform results extractions. Its base end-point pattern is:

   {domain}/api/AssessmentResultsService (For further information, see "AssessmentResultsService Controller – API Workflow Example" on page 44.)

2. **AssessmentInfo Controller** – This controller can be used for assessment and modeling information lookups, in addition to retrieving specifications that can be used for retrieving results. Its base end-point pattern is:

   {domain}/api/AssessmentResultsService.

3. **HealthMonitor Controller** — This is a health-check controller that can be used to ping the service to gain useful life and configuration information. Its base end-point pattern is:

   {domain}/api/HealthMonitor (For further information see "HealthMonitor Controller – API Workflow Example" on page 46.)

4. **Cleanup Controller** — This is an administration controller that can be used to check and clean up the results/job storage cache. Its base end-point pattern is:

   {domain}/api/Cleanup (For further information, see "Cleanup Controller – API Workflow Example" on page 46.)

Authentication

API endpoints used for security authentication:

- **POST {spi domain}/api/AssessmentResultsService/generatetoken**

  Authentication - Generate a valid bearer token configured with a default expiration time.

Results retrieval

API endpoints used for extraction of results:

- **POST {spi domain}/api/AssessmentResultsService/results**

  Results retrieval - Gets results from Synergi Pipeline - specified by the user's input resultsSpecification.

- **GET {spi domain}/api/AssessmentResultsService/results/{resultId}**

  Results retrieval - Checks if a results job is finished given the resultId used to "poll" the service until a results job (by resultid) is ready for retrieval.

- **GET {spi domain}/api/AssessmentResultsService/results/{resultId}/payload/{payloadId}**

  Results retrieval - Retrieves results job output (in payload packages) given the resultId and payloadId URLs for payload retrievals provided by the ResultsPayloadAddresses.

Assessment and Modeling information lookup

API end points used for display/lookup of assessment and modeling information, which might be required as input when specifying a results specification (for example, model names, model formula names, formula factor names). Can be used for creation of a user interface set of lookup/pick lists. There also exists endpoints that allow for the retrieval of a results specification given an assessment or model name.

- **GET {spi domain}/api/AssessmentInfo/assessmentnames/{EnumResultsWithModelsType}**

  Get the list of assessment names for a given results type. All the assessments are returned, no matter their status and if the assessments are completed or not. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/assessmentnames_results/{EnumResultsWithModelsType}**

  Get the list of assessment names that have results for a given results type. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/assessmentinfo/{EnumResultsWithModelsType}/name/{assessmentName}**

  Get the assessment info for a given results type and assessment name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelnames/{EnumResultsWithModelsType}**

  Get the list of model names for a given results type. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelnames_approvedresults/{EnumResultsWithModelsType}**

Get the list of model names for a given results type that have approved results. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelparts/{EnumResultsWithModelsType}/name/{modelName}**

  Get the list of model parts for a given results type and model name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelparts_assessment/{EnumResultsWithModelsType}/name/{assessmentName}**

  Get the list of model parts for a given results type and assessment name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelinfo/{EnumResultsWithModelsType}/name/{modelName}**

  Get the model info for a given results type and model name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelinfo/{EnumResultsWithModelsType}/name/{assessmentName}**

  Get the model info for a given results type and assessment name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/modelinfo_specification**

  Get the model info for a given specification. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/specification/{EnumResultsWithModelsType}/name/{modelName}**

  Get the results specification for a given results type and model name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/specification_assessment/{EnumResultsWithModelsType}/name/{assessmentName}**

Get the results specification for a given results type and assessment name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

- **GET {spi domain}/api/AssessmentInfo/keydataproperties/{modelName}**

  Get the list of property names on the key data template for a given results type and model name. Currently only results types with associated models are supported which includes AnalyticalAssessment, DefectAssessment, and RiskAssessment.

Administration

API end points used for management and cleanup of the results service caches:

- **DELETE {spi domain}/api/results/Cleanup/all**

  Deletes all the cached jobs.

- **DELETE {spi domain}/api/results/Cleanup/obsolete**

  Deletes all the cached jobs and prepared data including jobs which are expired or unfinished.

- **DELETE {spi domain}/api/results/Cleanup**

  Deletes the cached job and prepared data including jobs which are expired or unfinished for the specified result ID.

- **DELETE {spi domain}/api/results/Cleanup/confirm**

  Confirms the deletion of data as specified in the input confirm delete.

Health monitoring

API end points used for service health monitoring:

- **GET {spi domain}/api/HealthMonitor/state**

  Get service connection state for the service - Is it connected to a DBMS context?

- **GET {spi domain}/api/HealthMonitor**

  Get heartbeat for the service - Is it alive and responding?

- **GET {spi domain}/api/HealthMonitor/configuration**

  Get configuration parameters for the service.

- **GET {spi domain}/api/HealthMonitor/log**

  Get specified number of lines from the latest Serilog log file.

Breaking Changes (Version 1 to Version 2)

Along with various improvements and new functionality added to the service, several breaking changes were introduced to the API. The existing REST APIs can continue to be used without any impact or changes. When ready, applications can be migrated to the newer version of the API.

Model Information

All the model information API endpoints have been moved from the root {domain}/api/AssessmentResultsService to {domain}/api/AssessmentInfo URIs. In addition to moving the URIs, some of the data and the schema being returned can be different as referenced below.

ResultsPayloadV2DTO

Replaces the ResultsPayloadDTO Schema with a new version called ResultsPayloadV2DTO. The ResultsPayloadV2DTO no longer contains a ResultsSpecification, ResultsModelInfo and MetaData section. These sections were removed to reduce the payload size and in recognition that the information could be retrieved through the Assessment Info endpoints.

ResultsReadyV2DTO

Replaces the ResultsReadyDTO Schema with a new version called ResultsReadyV2DTO. The ResultsReadyV2DTO no longer contains a ResultsSpecification section. This section was removed to reduce the payload size.

ResultsSpecificationV2DTO

Replaces the ResultsSpecificationDTO Schema with a new version called ResultsSpecificationV2DTO. The ResultsSpecificationV2DTO no longer contains a ResultsFormulaGroup section. This section was removed and replaced by ResultsModelParts, which is a list of ResultsModelPartDTOs.

Approved Risk Assessment Results

When retrieving approved risk assessment results the, data section of the results payload has an analysisItems section. In this section are subsections called threats and consequences. These subsections have been renamed to totalThreats and totalConsequences. The threats and consequences sections now contain the individual threat and consequence factors and values.

API Endpoints (Version 1)

There is version 1 of the Assessment Results Service API. The functionality available for version 1 of the API endpoints can be grouped into the following.

- Authentication
- Approved results retrieval
- Modeling information lookup
- Administration
- Health monitoring

With URI path versioning, the version number will be included in the URI path. For version 1, the pattern will be {domain}/api or {domain}/api/v1.

The version of the service supports three controllers and various REST API endpoints on each:

1. **AssessmentResultsService Controller** — This is the main controller that consumers of the API will interact with to perform results extractions. Its base end-point pattern is:

   {domain}/api/AssessmentResultsService (For further information, see "AssessmentResultsService Controller – API Workflow Example" on page 44.)

2. **HealthMonitor Controller** — This is a health-check controller that can be used to ping the service to gain useful life and configuration information. Its base end-point pattern is:

   {domain}/api/HealthMonitor (For further information see "HealthMonitor Controller – API Workflow Example" on page 46.)

3. **Cleanup Controller** — This is an administration controller that can be used to check and clean up the results/job storage cache. Its base end-point pattern is:

   {domain}/api/Cleanup (For further information, see "Cleanup Controller – API Workflow Example" on page 46.)

Authentication

API endpoints used for security authentication:

- **POST {spi domain}/api/AssessmentResultsService/generatetoken**

  Authentication - Generate a valid bearer token configured with a default expiration time.

Approved results retrieval

API endpoints used for extraction of results:

- **POST {spi domain}/api/AssessmentResultsService/results**

  Results retrieval - Gets results from Synergi Pipeline - specified by the user's input resultsSpecification.

- **GET {spi domain}/api/AssessmentResultsService/results/{resultId}**

  Results retrieval - Checks if a results job is finished given the resultId used to "poll" the service until a results job (by resultid) is ready for retrieval.

- **GET {spi domain}/api/AssessmentResultsService/results/{resultId}/payload/{payloadId}**

  Results retrieval - Retrieves results job output (in payload packages) given the resultId and payloadId URLs for payload retrievals provided by the ResultsPayloadAddresses.

Modeling information lookup

API end points used for display/lookup of modeling information, which might be required as input when specifying a results specification (for example, model names, model formula names, formula factor names). Can be used for creation of a user interface set of lookup/pick lists:

- **GET {spi domain}/api/AssessmentResultsService/modelnames/{enumResultsType}**

  Modeling information lookup - Retrieves list of all models (regardless of results approval status) for a given EnumResultsType. Supports RiskAssessmentApproved or AnalyticalAssessmentApproved.

- **GET {spi domain}/api/AssessmentResultsService/modelnames_approvedresults/{enumResultsType}**

  Modeling information lookup - Retrieves list of all models (with approved/completed results) for a given EnumResultsType. Supports RiskAssessmentApproved or AnalyticalAssessmentApproved.

- **GET {spi domain}/api/AssessmentResultsService/groupnames/{modelName}**

  Modeling information lookup - Formula group names (within a model) given the Model name.

- **GET {spi domain}/api/AssessmentResultsService/formulafactors/{formulaId}**

Modeling information lookup - Factor names (within a formula group within a model) given the formulaId GUID.

- **GET {spi domain}/api/AssessmentResultsService/keyproperties/{modelName}**

  Modeling information lookup - List of properties on the key data template from the model specified.

Administration

API end points used for management and cleanup of the results service caches:

- **DELETE {spi domain}/api/results/Cleanup/all**

  Administration - Deletes all cached jobs information and cleans up.

- **DELETE {spi domain}/api/results/Cleanup/obsolete**

  Administration - Deletes cached jobs information along prepared data which are: expired, broken, unfinished.

- **DELETE {spi domain}/api/results/Cleanup**

  Administration - Deletes cached jobs information along prepared data which are: expired, broken, unfinished.

- **DELETE {spi domain}/api/results/Cleanup/confirm**

  Administration - Confirms deleting of data.

Health monitoring

API end points used for service health monitoring:

- **GET {spi domain}/api/HealthMonitor/state/new**

  Health monitoring - Gets RabbitMQ server and queues health statuses in ASP.NET Core health check format, which has statuses:

  - Healthy
  - Unhealthy

  The queue "tenant" is configurable and queue status is based on message depth. Message depth threshold is configurable.

- **GET {spi domain}/api/HealthMonitor/state**

Health monitoring - Gets service connection state for the service - Is it connected to a DBMS context?

Converted to **GET {spi domain}/api/HealthMonitor/state/new** (listed above), which is the format used starting in Synergi Pipeline 9.0.

Previously, health check had two statuses: "OK" (Healthy) and "FAIL" (Degraded or Unhealthy).

- **GET {spi domain}/api/HealthMonitor**

  Health monitoring - Gets heartbeat for the service - Is it alive and responding?

- **GET {spi domain}/api/HealthMonitor/configuration**

  Health monitoring - Gets configuration parameters for the service, including appsettings.json file data. Hides values of configuration keys contains ''pwd'', ''secret'', ''password'', and ''connection''. Includes build date, version, and file version.

- **GET {spi domain}/api/HealthMonitor/log**

  Health monitoring - Gets specified number of lines from the latest Serilog log file.

REST, POST, and GET Calling Patterns

The main AssessmentResultsService controller supports a single REST pattern is used in all cases to retrieve both large and small results. A minimum of two REST calls are necessary: a “POST” call and at least one or more “GET” calls.

Preparation

The results are requested with a REST POST call with input parameters; the input parameters are contained on a JSON payload called the resultsSpecificationDTO. The resultsSpecificationDTO specifies the type of results set being requested and all other user-allowed input options. The call is validated immediately, and some summary statistics about the request are gathered. If valid, it is synchronously returned in under four minutes using an output JSON payload called the ResultsReadyDTO. The ResultsReadyDTO indicates whether the job’s collection step is completed or currently running (that is, either resultsReadyDTO.resultsReady = true, or resultsReadyDTO.resultsReady = false). This step is called “Preparation”.

Collection

In parallel with returning the results of the “Preparation” step, the service also spawns a background task internally to begin the results “Collection” step. Results collection is the process of gathering the results (and preparing them into the format) and payloads for future return to the user. Results are

not marked as ready for user download until all payloads are generated and cached into the service's results state cache.

When results are ready, results metadata is returned, with validation information and the status when the user polls the service. When ready, the results can be retrieved immediately on subsequent "GET" calls with the information provided in the ResultsReadyDTO response.

Polling calls (comprised of 0-N) GETs are required by the consumer until the service's "Collect" step is completed.

The results will continue to be constructed on the server, but the client will receive (resultsReadyDTO.resultsReady=false) and will re-poll periodically by using the "resultId" for the request until resultsReadyDTO.resultsReady = true.

When final results collection is complete (resultsReadyDTO.resultsReady=true), the response will contain the one or more URL addresses to be used to get/pull the single or multiple payload/packages for the result. One or more similar "GET" calls will be used to pull each payload/package as needed.

ResultsSpecificationDto (Version 2)

The ResultsSpecificationV2DTO (Results Specification Data Version 2 Transfer Object), and its internal sub- properties describe the JSON payload posted during POST:\ api/AssessmentResultsService/ results. This JSON structure contains all user-controlled input parameters used to specify what type of results to extract, as well as other optional conditions that control the contents of the outputs.

The type of results requested (through the resultsType property), is controlled by the EnumResultsType list. This list can be for one of the following values only, with resulting supported options unique to each EnumResultsType specified.

Valid values for **EnumResultsType** (string):

- RiskAssessmentApproved
- AnalyticalAssessmentApproved
- HcaAssessmentApproved
- ClAssessmentApproved
- DefectAssessmentApproved
- AnalyticalAssessment
- DefectAssessment
- RiskAssessment

ResultsSpecificationV2DTO:

{

"resultsScope": {

"modelName": "",

"assessmentName": "",

"resultsType": **EnumResultsType**,

"resultsTypeOptions": {

},

"returnFormat": "",

},

"resultsModelParts": [],

"resultsKeyDataProperties": []

}

Property	Data Type	Usage
modelName	String	For example: "modelName": "2023RiskResults_2", Required valid, existing, model name with approved results associated, for EnumResultsType: RiskAssessmentApproved, AnalyticalAssessmentApproved, DefectAssessmentApproved. Can be empty "", or "NA", for all other EnumResultsType.

assessmentName	String	For example: "assessmentName": "2023Assessment", Required valid, existing, assessment name with results associated, for EnumResultsType: RiskAssessment, AnalyticalAssessment, and DefectAssessment. Can be empty “”, or “NA”, for all other EnumResultsType.
resultsType	String	For example: "resultsType": "RiskAssessmentApproved", Required enum string: RiskAssessmentApproved AnalyticalAssessmentApproved HcaAssessmentApproved ClAssessmentApproved

resultsTypeOptions	JSON property	Optional, if provided, provides additional report parameters. Supported options properties include: For example: "includeGeometries": "false" For all EnumResultsType includeGeometries (string) – Boolean “true/false” defaults to “false” – controls whether for all EnumResultsTypes if additional geometry properties will be added to the output payloads on extraction. **NOTE:** Adding geometries to the output payloads greatly increases payload size downloaded, so only include geometries if they are truly required. For example: "AssessmentApprovers": ["Becky", "Fred"] For EnumResultsType: RiskAssessmentApproved, "AssessmentApprovers" - JSON List of string [“name1”, “name2”] – will filter approved results to include only those approved by the Synergi Pipeline user names provided in the names list.
returnFormat	String	For example: "returnFormat": "json", Optional, if specified must contain formatEnum value “json”, Defaults to “json”.

resultsModelParts	JSON collection	For example:
		"resultsModelParts": [
		{
		Name":
		"MyModelPart1",
		“Type”:
		“Threat”
		"factorNames"
		: [
		"Diameter",
		"Pressure",
		"safetyfactor"
		]
		}
		]
		EnumModelPartType can be Consequence, FormulaGroup, SharedFactorsGroup, or Threat.
		Required — EnumResultsType:AnalyticalAssessmentApproved, DefectAssessmentApproved, RiskAssessmentApproved, AnalyticalAssessment, DefectAssessment, RiskAssessment
		Contains list of model parts names, types and factor names within each, from the model for results extraction. Only the model parts names listed will be extracted into the results payloads.
		Ignored — EnumResultsType: HcaAssessmentApproved, ClAssessmentApproved

resultsKeyDataProperties	JSON collection	For example:
		
		"resultsKeyDataProperties": [
		{
		"propertyName": "Diameter"
		},
		{
		"propertyName": "MaterialType"
		}
		]
		
		Optional - EnumResultsTypeRiskAssessmentApproved, AnalyticalAssessmentApproved Contains optional JSON collection list of property names from the model's key data template for inclusion in the results payload records.
		
		Ignored – EnumResultsType: HcaAssessmentApproved, ClAssessmentApproved

EnumResultsType Examples

EnumResultsType examples are provided for:

- RiskAssessmentApproved
- AnalyticalAssessmentApproved
- HcaAssessmentApproved
- ClAssessmentApproved
- DefectAssessmentApproved
- AnalyticalAssessment
- DefectAssessment
- RiskAssessment

RiskAssessmentApproved Example

Extract latest risk assessment approved results, include geometries, do not filter by approver (include all approvers), do not include additional resultModelParts (include only risk threat and cconsequence totals), do not include any additional fields from the source data's key data template.


```
{
"resultsScope": {
        "modelName": "testModel_2",
        "resultsType": "RiskAssessmentApproved",
        "resultsTypeOptions": {
          "includeGeometries": "true"
        },
        "returnFormat": "json",
},
"resultsModelparts": [],
"resultsKeyDataProperties": []
}
```


RiskAssessment Example

Extract latest risk assessment results, include geometries, include additional resultModelParts (include only risk threat and cconsequence totals), do not include any additional fields from the source data's key data template.


```
{
"resultsScope": {
        "modelName": "testModel_2",
        "resultsType": "RiskAssessmentApproved",
        "resultsTypeOptions": {
          "includeGeometries": "true"
        },
        "returnFormat": "json",
},
```

```
"resultsModelparts": [],
"resultsModelParts": [
        {
          "Name": "MyModelPart1",
          "Type":
          "Threat"
        "factorNames": [
        "Diameter", "Pressure", "safetyfactor"
         ]
        }
        ]
"resultsKeyDataProperties": []
}
```


AnalyticalAssessmentApproved Example

Extract latest analytical assessment completed results, include geometries, include in output the factor results for D, Diameter, Pressure, SafetyFactor, from formula group Test Group. Do not include any additional property values from the source key data template for the model.


```
{
"resultsScope": {
        "modelName": "TestModel",
        "resultsType": "AnalyticalAssessmentApproved",
        "resultsTypeOptions": {
          "includeGeometries": "true"
        },
        "returnFormat": "json",
},
"resultsModelParts": [
 {
```

```
        "name": "TestGroup",
        "type": "FormulaGroup",
        "factorNames": [
          "D",
          "Diameter",
          "Pressure",
          "Safetyfactor"
        ]
  }
 ],
"resultsKeyDataProperties": []
}
```


HcaAssessmentApproved Example

Extract latest HCA assessment approved results. Do not include geometries.


```
{
 "resultsScope": {
        "modelName": "NA",
         "resultsType": "HcaAssessmentApproved",
         "resultsTypeOptions": {
             "includeGeometries": "false"
        },
         "returnFormat": "json",
 },
 "resultsModelParts": [],
 "resultsKeyDataProperties": []
}
```

ClAssessmentApproved Example

Extract latest Class Location assessment approved results, include geometries.

```
{
 "resultsScope": {
        "modelName": "NA",
         "resultsType": "ClAssessmentApproved",
         "resultsTypeOptions": {
            "includeGeometries": "true"
        },
         "returnFormat": "json",
 },
 "resultsModelParts": [],
 "resultsKeyDataProperties": []
}
```

ResultsSpecificationDto (Version 1)

The ResultsSpecificationDto (Results Specification Data Transfer Object), and its internal sub-properties describe the JSON payload posted during POST:\ api/AssessmentResultsService/ results. This JSON structure contains all user-controlled input parameters used to specify what type of results to extract, as well as other optional conditions that control the contents of the outputs.

The type of results requested (through the resultsType property), is controlled by the EnumResultsType list. This list can be for one of the following values only, with resulting supported options unique to each **EnumResultsType** specified. Examples for each EnumResultsType are provided in "EnumResultsType Examples" on page 26.

Valid values for **EnumResultsType** (string):

- RiskAssessmentApproved
- AnalyticalAssessmentApproved
- HcaAssessmentApproved
- ClAssessmentApproved

ResultsSpecificationDto:

{

"resultsScope": {

"modelName": "",

"resultsType": **EnumResultsType**,

"resultsTypeOptions": {

},

"returnFormat": "",

},

"resultsFormulaGroups": [],

"resultsKeyDataProperties": []

}

Property	Data Type	Usage
modelName	String	For example: "modelName": "2023RiskResults_2", Required valid, existing, model name with approved results associated, for EnumResultsType: RiskAssessmentApproved, AnalyticalAssessmentApproved, Required for EnumResultsType: HcaAssessmentApproved, ClAssessmentApproved, can be empty “”, or “NA”,
resultsType	String	For example: "resultsType": "RiskAssessmentApproved", Required enum string: RiskAssessmentApproved AnalyticalAssessmentApproved HcaAssessmentApproved ClAssessmentApproved

resultsTypeOptions	JSON property	Optional, if provided, provides additional report parameters. Supported options properties include: For example: "includeGeometries": "false" For all EnumResultsType includeGeometries (string) – Boolean "true/false" defaults to "false" – controls whether for all EnumResultsTypes if additional geometry properties will be added to the output payloads on extraction. **NOTE:** Adding geometries to the output payloads greatly increases payload size downloaded, so only include geometries if they are truly required. For example: "AssessmentApprovers": ["Becky", "Fred"] For EnumResultsType: RiskAssessmentApproved, "AssessmentApprovers" - JSON List of string ["name1", "name2"] – will filter approved results to include only those approved by the Synergi Pipeline user names provided in the names list.
returnFormat	String	For example: "returnFormat": "json", Optional, if specified must contain formatEnum value "json", Defaults to "json".

resultsFormulaGroups	JSON collection	For example:
		"resultsFormulaGroups": [
		{
		"groupName": "MyFormulaGroup",
		"factorNames": [
		"Diameter",
		"Pressure",
		"safetyfactor"
		]
		}
		]
		
		Required — EnumResultsType: AnalyticalAssessmentApproved
		Contains list of model formula group names, and factor names within each, from the model for results extraction. Only the formula group names listed will be extracted into the results payloads.
		
		Optional — EnumResultsType: RiskAssessmentApproved
		Contains additional optional list of model formula group names, and factor names within each, from the model for results extraction. In addition to the summary risk values, these internal formula results values will be extracted into the payload records as well.
		
		Ignored — EnumResultsType: HcaAssessmentApproved, ClAssessmentApproved

resultsKeyDataProperties	JSON collection	For example:
		"resultsKeyDataProperties": [
		{
		"propertyName": "Diameter"
		},
		{
		"propertyName": "MaterialType"
		}
		]
		Optional - EnumResultsType: RiskAssessmentApproved, AnalyticalAssessmentApproved Contains optional JSON collection list of property names from the model's key data template for inclusion in the results payload records.
		Ignored – EnumResultsType: HcaAssessmentApproved, ClAssessmentApproved

EnumResultsType Examples

EnumResultsType examples are provided for:

- RiskAssessmentApproved
- AnalyticalAssessmentApproved
- HcaAssessmentApproved
- ClAssessmentApproved

RiskAssessmentApproved Example

Extract latest risk assessment approved results, include geometries, do not filter by approver (include all approvers), do include additional resultsFormulaGroups (include only risk results formula outputs), do not include any additional fields from the source data's key data template.

```
{
 "resultsScope": {
        "modelName": "testModel_2",
         "resultsType": "RiskAssessmentApproved",
```

```
        "resultsTypeOptions": {
            "includeGeometries": "true"
        },
        "returnFormat": "json",
 },
 "resultsFormulaGroups": [],
 "resultsKeyDataProperties": []
}
```

AnalyticalAssessmentApproved Example

Extract latest analytical assessment completed results, include geometries, include in output the factor results for D, Diameter, Pressure, SafetyFactor, from formulat group TestGroup. Do not include any additional property values from the source key data template for the model.

```
{
 "resultsScope": {
        "modelName": "TestModel",
        "resultsType": "AnalyticalAssessmentApproved",
        "resultsTypeOptions": {
            "includeGeometries": "true"
        },
        "returnFormat": "json",
 },
 "resultsFormulaGroups": [
     {
         "groupName": "TestGroup",
         "factorNames": [
            "D",
            "Diameter",
            "Pressure",
```

```
            "Safetyfactor"
          ]
        }
    ],
 "resultsKeyDataProperties": []
}
```


HcaAssessmentApproved Example

Extract latest HCA assessment approved results. Do not include geometries.


```
{
 "resultsScope": {
        "modelName": "NA",
         "resultsType": "HcaAssessmentApproved",
         "resultsTypeOptions": {
            "includeGeometries": "false"
        },
         "returnFormat": "json",
 },
 "resultsFormulaGroups": [],
 "resultsKeyDataProperties": []
}
```


ClAssessmentApproved Example

Extract latest Class Location assessment approved results, include geometries.


```
{
 "resultsScope": {
        "modelName": "NA",
         "resultsType": "ClAssessmentApproved",
         "resultsTypeOptions": {
```

```
            "includeGeometries": "true"
        },
        "returnFormat": "json",
    },
    "resultsFormulaGroups": [],
    "resultsKeyDataProperties": []
}
```

Security

Security is provided by requiring recognized bearer tokens on all service calls. The tokens require an encrypted secret, expiration date/time, and a "READ" user role. Bearer tokens can be generated by the service itself (if configured to allow this) given a set of credentials. Alternatively, they can also be generated by the client consumer (if allowed) by administrators through means of a shared secret configured in the service. Bearer tokens require this secret and also an expiration date/time and a "READ" user role, which are all configurable.

Inside the service there are three stages of fulfilling a results request:

- **Get or generate bearer token**
  - These can be self-generated given knowledge of the public "secret" resident in the service or can be generated by the service (using REST call generatetoken) given credentials configured in the service.
  - Valid bearer tokens are then attached to the header of all requests.
- **Preparation** - Returned synchronously
  - Post ResultsRequest call using resultsSpecificationDTO. Preparation will perform request validation and sizing and will quickly return a result (less than four minutes) using the ResultsReadyDTO.
  - Returns ResultsReadDTO.resultsReady = false
    - Also initiates the results "Collection" step in the background (if the request is valid).
- **Collection** – Returned asynchronously; must be polled until completion.
  - Results collection can take 0-n minutes depending on volume and complexity of the results; users are provided a "resultId" for use in subsequent polling requests.
    - Returns ResultsReadyDTO.ResultId = (guid) containing the resultID for future polling and payload extractions.
    - Returns ResultsReadyDTO.resultsReady = true when ready; false indicates that the collect step is still running.
  - ResultsReadyDTO.resultsPayloadAddresses (1-n) – may entail one or more payload retrievals, sized by record count in configuration.

In addition to normal operations (connected to a Synergi Pipeline database), the service also offers a "mock" (or dummy) operational mode, where it will return mock example data without being connected to any DBMS. This mode can be used for trials or API exploration without need of a Synergi Pipeline database with real data. Its use is described more fully in "Appendix A: Mock Mode/Dummy Data Generation" on page 48.

Deployment

Instructions for on-premise deployment of the Synergi Pipeline Assessment Results Service API are provided in this section.

For Synergi Pipeline Software as a Service (SaaS) deployments, DNV implements the Synergi Pipeline Assessment Results Service API deployment process for your Synergi Pipeline environment.

For further information or assistance, contact the direct technical support contact person listed in your contract agreement or contact DNV - Digital Solutions Technical Support at software.support@dnv.com.

Deploying the Assessment Results Service API

For on-premise deployments of the Synergi Pipeline Assessment Results Service API, the on-premise installation script looks for a copy of the appsettings.json file in the Setup folder and copies it into place after deployment.

1. Configure the appsettings.json file and name it: ARS_appsettings.json
2. Copy it to the wwwroot\sitename\SETUP folder where it will persist across installs.
3. Run an install so PowerShell will move it into place.

NOTE: You can optionally copy it manually into the service as follows:

folder: \PIMSWeb\NetCoreServices\DNV.Spi.AssessmentResultsService.Api

file name: appsettings.json

An example of configuration for the appsettings.json file is as follows:

```
{
"Startup": {
   "IsMock": "False",
   "MockPayloadRecordCount": 12,
   "MockTotalRecordCount": 12,
   "IsCORS": "False",
   "UseGZipCompression": "True", //true = GZip on, false = no compression
   "GZipCompressionType": "Optimal", //"Optimal", "Fastest","NoCompression"
   "AllowBearerTokenGeneration": "True", //callers can ask the service to generate their own tokens
```

```
    "GeneratedBearerTokenUserName": "MyUser", //callers user name to check if generating tokens
    "GeneratedBearerTokenPassword": "MyPassword", //callers password name to check if generating tokens
    "GeneratedBearerTokenExpHrs": 0, //generated tokens expiration period
    "GeneratedBearerTokenExpMins": 10, //default 10 minutes
    "GeneratedBearerTokenExpSecs": 0
},
"CacheStorage": {
//"Type": "SqlLite"
    "Type": "MSSQL"
},
"JobsStorage": {
    "Type": "MSSQL"
//"Type": "SqlLite"
},
"JobHandler": {
    "CollectAsynchronously": true,
    "CacheRetentionTimeHrs": 720, //1 month
    "CleanupOnStartup": true,
    "CleanupTimeoutMins": 10
},
"ConnectionStrings": {
    "ConnectionType": "SqlServer",
    "JobsStorageConnection": "server=SQLServerName;database=Database_Name_REP;uid=orbitpipeline;pwd=SQLPassword;", //typically the spi rep database, but can be any
    "CacheStorageConnection": "server=SQLServerName;database=Database_Name_REP;uid=orbitpipeline;pwd=SQLPassword;", //typically the spi rep database, but can be any
    "ConnectionPM": "server=SQLServerName;database=TEST_SP_TRANS_SI_8_6_0_0_PM;uid=orbitpipeline;pwd=SQLPassword;", //spi pm database
```

"ConnectionRep": "server=SQLServerName;database=Database_Name_REP;uid=orbitpipeline;pwd=SQLPassword;" //spi rep database

},

//internal JWT is meant to be the secret from SPi

"Jwt": {

"Secret": "SecretGUID"

},

//publish JWT is meant to be different from internal, and for use by outside API consumers

"PublicJwt": {

"Secret": "SecretGUID2"

},

"Services": {

},

"SystemOptions": {

"CacheBlockRecordCount": 10000,

"DatabaseFetchSize": 50000,

"AdminGuideFolderName": "Documents", //name of admin guide folder on server disk

"AdminGuideFileNamePDF": "SynPipelineAssessResultsSvcAPI_AdminGuide.pdf", //name of admin guide in service footprint so user can download if desired

"AdminGuideFileNameHTML": "AdminGuide.html" //name of admin guide in service footprint so user can display if desired

},

"Logging": {

"LogLevel": {

"Default": "Information"

}

},

"AllowedHosts": "*"

}

Configuration Settings

This section describes configuration settings, including:

- Use of Mock/Dummy Data
- Response Compression
- Security
  - Startup
  - Other
- Service Job and Cache Storage
- Database Connection Strings
  - Results service state cache tables
  - Results service reading Synergi Pipeline results and metadata
- System Operational Options
- Serilog Logging Options

Settings controlling use of Mock/Dummy data

"Startup": "IsMock": "False", (string, True/False)	If False, the connectionSettings options below will connect the service to one or more DBMSs. If True, the service will not be connected to any DBMS, but will respond with mock/dummy data to all requests. IsMock = True is used for testing and debugging purposes only.
"Startup": "MockPayloadRecordCount": 12, (Integer 1-N)	Number of records per payload, by default, generated when using IsMock=True
"Startup": "MockTotalRecordCount": 12, (Integer 1-N)	Total number of records generated, by default, when using IsMock=True

Response compression settings

"Startup": "UseGZipCompression": "True", (string, True/False)	If True = GZip compression will be on by default for all returned REST responses. If False = No compression of REST responses.
"Startup": "GZipCompressionType": "Optimal" (string, keyword: "Optimal", "Fastest", "NoCompression")	Controls the type of Gzip compression provided by the service on its responses.

Security Settings - Startup

"Startup": "IsCORS": "False", (string, True/False)	Allows cross-site request calls true or false. In production this should be = False to ensure proper bearer token validation and to prevent cross-site-scripting attacks.
"Startup": "AllowBearerTokenGeneration": "True", (string, True/False)	Indicates whether the API will support a call from users to /generatetoken to generate their own bearer tokens with input credentials. If True the /generatetoken endpoint will be active. If False, it will be disabled, and users must generate their own tokens externally.
"Startup": "GeneratedBearerTokenUserName": "MyUser", (string)	If AllowBearerTokenGeneration = True, desired name credential user may provide through the generatetoken API.
"Startup": "GeneratedBearerTokenPassword": "someHardToGuessPasswordGoesHere", (string)	If AllowBearerTokenGeneration = True, desired password credential user may provide through the generatetoken API.
"Startup": "GeneratedBearerTokenExpHrs": 0, (integer, 0-N)	If AllowBearerTokenGeneration = True, desired default number of hours for tokens generated through the generatetoken API. If users specify this number in their incoming request, it will override this default.

"Startup": "GeneratedBearerTokenExpMins": 10, (integer, 0-N)	If AllowBearerTokenGeneration = True, desired default number of minutes for tokens generated through the generatetoken API. If users specify this number in their incoming request, it will override this default.
"Startup": "GeneratedBearerTokenExpSecs": 0 (integer, 0-N)	If AllowBearerTokenGeneration = True, desired default number of seconds for tokens generated through the generatetoken API. If users specify this number in their incoming request, it will override this default.

Security Settings - Other

"InternalJwt": "Secret": "someEncryptedStringHere" (string)	Contains Synergi Pipeline's encrypted product secret. For use in communications between Synergi Pipeline's other services internally.
"PublicJwt": "Secret": " someOtherEncryptedStringHere " (string)	Contains Synergi Pipeline's encrypted external product secret. For use in communications between consumers of the public API externally. If AllowBearerTokenGeneration = False, then this secret would have to be shared with external consumers of the results API so that they can generate their own valid bearer tokens externally.
"AllowedHosts": "*" (string)	Used for host filtering to optionally bind this application to specific host names. For example, if you replace "*" with "example.com", then the service will be restricted to run only under: *http://example.com/*

Service job and cache storage settings

"CacheStorage": "Type": "MSSQL" (string, keyword: "MSSQL", "SqlLite", "Oracle")	Type of DBMS storage for the service's Payload Cache tables (AR_KEYVALUEPARS, AR_PAYLOADS)
"JobsStorage":"Type": "MSSQL" (string, keyword: "MSSQL", "SqlLite", "Oracle")	Type of DBMS storage for the service's Jobs Cache table (AR_JOBS)

"JobHandler": "CollectAsynchronously": true (Boolean True/False)	Controls whether the "collect" step will be Synchronous (false) or Asynchronous (true). In normal operation in production, this value should be set to "true" so that the collection step (which might take several minutes) will be run in the background and not attached to the "Prepare" step synchronously.

Database Connection Strings

Connection strings for the results service state cache tables

"ConnectionStrings": "JobsStorageConnection": "sqlServer or Oracle connection String to the Jobs storage (AR_Jobs)",
"ConnectionStrings": "CacheStorageConnection": "sqlServer or Oracle connection String to the results cache storage (AR_Payloads, AR_KeyvaluePairs)",
SqlLite Example: "ConnectionStrings": "JobsStorageConnection": "FileName=C:\\temp\\SpiAssessmentResultsJobs.db", - Example connection string containing drive, path, and filename, if JobsStorage, or CacheStorage.Type = 'SqlLite'. **NOTE:** SqlLite is normally used for localized testing and debugging, not for production deployments due to possible disk space constraints.

Connection strings for the results service reading Synergi Pipeline results and metadata

"ConnectionStrings": "ConnectionType": "SqlServer", (string, keywords: "SqlServer", "Oracle")
"ConnectionStrings": "ConnectionPM": "sqlServer or Oracle connection string to the Synergi Pipeline Product (PM) database – metadata is retrieved from here",
"ConnectionStrings": "ConnectionRep": "sqlServer or Oracle connection string to the Synergi Pipeline Reporting (REP) database – results data is retrieved from here"

System Operational Options

"SystemOptions": "CacheBlockRecordCount": 10000, (integer, 1-N)	Controls the size of payloads (blocks) constructed during the "Collect" phase of processing. This number controls the number of records compressed onto each block in internal cache storage in the AR_Keyvaluepairs cache table as well as the number of records returned per payload for each results request. For example, if the overall results set contains 100,000 records and this value is set to 10,000, then the services collect processing will construct 10 payloads of 10,000 records each to be made ready for user download. This number should be tuned based on desired consumer output and networking constraints. It controls the record count size of payloads users wish to download from the server.
"SystemOptions": "DatabaseFetchSize": 50000, (integer, 1-N)	Controls the number of records fetched per page when reading through the database. This number controls how many records at a time will be resident in the server "Collect" processing before being flushed to the results cache tables. In effect this controls the size of the in-memory record set in the service at a given time during "Collect". This value should be tuned based on DBMS access and also on peak memory loads available to the service.
"SystemOptions": "CleanupOnStartup": "False", (string, True/False)	Controls whether or not cache clean up occurs upon start-up. Enabling this option helps keep the cache from growing too large, which can cause timeouts to occur during start-ups.

"RiskAssessmentEngine": "TransmissionCacheBlockRecordCount": 100, (integer, 1-N)	Optional setting to control and tune the cache block record count for transmission risk models, superseding the default "SystemOptions.CacheBlockRecordCount" value. Transmission data is usually shaped very differently to distribution data, having far fewer analysis items but with much more data on them. The default "SystemOptions.CacheBlockRecordCount" value of 10,000 could therefore consume too much memory in the service to store all the analysis items.
"RiskAssessmentEngine": "TransmissionDatabaseFetchSize": 100, (integer, 1-N)	Optional setting to control the number of records fetched per page when reading through the database for transmission risk models, superseding the default "SystemOptions.DatabaseFetchSize" value. Transmission data is usually shaped very differently to distribution data, having far fewer analysis items but with much more data on them. The default "SystemOptions.DatabaseFetchSize" value of 10,000 could therefore return too much data for the service to process and unnecessarily tax the database server.
"RiskAssessmentEngine": "DistributionCacheBlockRecordCount": 10000, (integer, 1-N)	Optional setting to control and tune the cache block record count for distribution risk models, superseding the default "SystemOptions.CacheBlockRecordCount" value. See "SystemOptions.CacheBlockRecordCount" for more details.
"RiskAssessmentEngine": "DistributionDatabaseFetchSize": 50000, (integer, 1-N)	Optional setting to control the number of records fetched per page when reading through the database for distribution risk models, superseding the default "SystemOptions.DatabaseFetchSize" value. See "SystemOptions.DatabaseFetchSize" for more details.

"AnalyticalAssessmentEngine": "TransmissionCacheBlockRecordCount": 100, (integer, 1-N)	Optional setting to control and tune the cache block record count for transmission analytical models, superseding the default "SystemOptions.CacheBlockRecordCount" value. Transmission data is usually shaped very differently to distribution data, having far fewer analysis items but with much more data on them. The default "SystemOptions.CacheBlockRecordCount" value of 10,000 could therefore consume too much memory in the service to store all the analysis items.
"AnalyticalAssessmentEngine": "TransmissionDatabaseFetchSize": 100, (integer, 1-N)	Optional setting to control the number of records fetched per page when reading through the database for transmission analytical models, superseding the default "SystemOptions.DatabaseFetchSize" value. Transmission data is usually shaped very differently to distribution data, having far fewer analysis items but with much more data on them. The default "SystemOptions.DatabaseFetchSize" value of 10,000 could therefore return too much data for the service to process and unnecessarily tax the database server.
"AnalyticalAssessmentEngine": "DistributionCacheBlockRecordCount": 10000, (integer, 1-N)	Optional setting to control and tune the cache block record count for distribution analytical models, superseding the default "SystemOptions.CacheBlockRecordCount" value. See "SystemOptions.CacheBlockRecordCount" for more details.
"AnalyticalAssessmentEngine": "DistributionDatabaseFetchSize": 50000, (integer, 1-N)	Optional setting to control the number of records fetched per page when reading through the database for distribution analytical models, superseding the default "SystemOptions.DatabaseFetchSize" value. See "SystemOptions.DatabaseFetchSize" for more details.

"ClassLocationAssessmentEngine": { "CacheBlockRecordCount": 10000 }, (integer, 1-N)	Optional setting to control and tune the cache block record count for class location, superseding the default "SystemOptions.CacheBlockRecordCount" value. See "SystemOptions.CacheBlockRecordCount" for more details.
"HcaAssessmentEngine": { "CacheBlockRecordCount": 10000 }, (integer, 1-N)	Optional setting to control and tune the cache block record count for HCA and MCA, superseding the default "SystemOptions.CacheBlockRecordCount" value. See "SystemOptions.CacheBlockRecordCount" for more details.
"SystemOptions": "CleanupTimeoutMins":10, (integer, 1-N)	Controls the length of time during which cache clean up can occur before the start-up process times out. Large cache clean-ups can cause start-ups to time out if this setting is not long enough.
"SystemOptions": "CacheRetentionTimeHrs": 5000, (integer, 1-N)	Controls the length of time jobs and cached results payloads will stay in the service's state cache tables awaiting retrieval. Jobs and cached ("collected") payloads older than this value will become candidates for expiration/removal by the service.
"SystemOptions": "AdminGuideFolderName": "Documents", (string)	Folder name on server disk. Contains the name of the Administration Guide folder on server disk. Swagger endpoint documentation allows downloads of the server's Administration Guides and online review. This folder on disk contains the latest source documents.
"SystemOptions": "AdminGuideFileNamePDF": "AdminGuide.pdf", (string)	Name of Administration Guide in service footprint (in PDF format) so users can download if desired using the Swagger endpoint documentation.
"SystemOptions": "AdminGuideFileNameHTML": "AdminGuide.html" (string)	Name of Administration Guide in service footprint (in HTML format) so users can display it online using the Swagger endpoint documentation.

Serilog Logging Options

LogLevel "Verbose", "Debug", "Information", "Warning","Error", "Fatal" (string)	Minimum log level. Default is "Information". "Verbose" and "Debug" levels should only be used for limited trials and debugging in production. Log Levels: • Verbose - Noisiest level; rarely (if ever) enabled for production. • Debug - Used for internal system events that are not necessarily observable from the outside; useful when determining how something happened. • Information - Information events describe things happening in the system that correspond to its responsibilities and functions. Generally these are the observable actions the system can perform. • Warning - When service is degraded, endangered, or may be behaving outside of its expected parameters, Warning level events are used. • Error - When functionality is unavailable or expectations broken, an Error event is used. • Fatal - The most critical level, Fatal events demand immediate attention.
Path ".//LogFiles//{my ServiceName]_.json"	Relative path on server disk to SeriLog files written by the service. (Appending pattern _.json will create automated date/time stamped files.)
Uri "https://spiseq.abc.nonprod.kubeit.yeah.com/"	Uri to optional centralized SEQ logging server. If blank, SEQ centralized logging will be skipped. Default is blank.
ApiKey "HfM28KzjgmsUBoTEFABC"	API Key to SEQ centralized logging server. If blank, SEQ centralized logging will be skipped. Default is blank.

Enrichers [collection, 0 or more] Empty/	0 or more enricher tags in a collection; used to differentiate log messages from multiple sources.
Key “ClientID”	Keyname value for the tag.
Value “{myTenentName}”	Value for the tag.

AssessmentResultsService Controller – API Workflow Example

A draft API workflow example is provided in this section. Also, consumers of the API should consult the online Swagger API documentation for examples of all JSON payloads.

Get or generate bearer token

- Can be self-generated given the internal "secret", or can be generated by a service call given credentials
    - Specify an expiration time on token
    - Specify the "READ" user role (for self-generated tokens; tokens generated automatically already have the "READ" user (Basic User) role assigned)
- Attach bearer token to all other POST and GET requests

POST {spi domain}/api/AssessmentResultsService/generatetoken

Post body for generatetoken request

```
{
    "userName": "MyUser",
    "password": "MyPassword",
    "expMins": 5, //optional
}
```

Response:


```
{ "token" : "Bearer
eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJuYW1laWQiOiJBc3Nlc3NtZW50UmVzdWx0
c0FaUdlbmVyYXRlZC1NeVVzZXIiLCJuYmYiOjE2MTY3MDEyOTAsImV4cCI6MTYxNjcwMTU5MCwiaW
F0IjoxNjE2Nz
AxMjkwfQ.pbyArssp69H8VI7_hMWkQGmDDPB1fT8gfNEeg93nhOM" ,
"expirationDateTime" : "2021-03-25T19:46:30.3508349Z" }
```


The token value "Bearer… and so on" string would be put into the authentication header on all calls shown in the following section.

POST {spi domain}/api/AssessmentResultsService/results

Authorization: Bearer *or JWT access token, or other authorization header here*

Content-type: application/JSON

Post Payload = (resultsSpecificationDTO) AnalyticalAssessmentApproved or any other results type.

If validation fails: 400 response or other REST error code is issued, including message about what was wrong with the input.

Response = (resultsErrorDTO)

If validation succeeds (and result not ready yet): Result is not ready yet

Response = (resultsReadyDTO, resultsReady=false)

If not ready yet, client should POLL periodically until resultsReady=true (estimated polling frequency can vary, but every 60 seconds might be reasonable)

Poll with resultId for results status periodically until results generation is completed

GET {spi domain}/api/AssessmentResultsService/results/06b4bfdf-aa41-4909-b417-56d6b8d01f8e

Response = (resultsReadyDTO.resultsReady = false)

Try again, until:

Response = (resultsReadyDTO .resultsReady = true)

Using the resultsPayloadAddresses, the results data can then be returned on 1 through N subsequent calls for each payload using resultsReadyDTO URL addresses as shown above.

ResultsPayload collection addresses are called to "GET" each payload with the resultId. The ResultsPayloadDTO will be retrieved for each payload set of records.

GET {spi domain}/api/AssessmentResultsService/results/06b4bfdf-aa41-4909-b417-56d6b8d01f8e/payload/0

Response = (ResultsPayloadDTO) …1 of 6

GET {spi domain}/api/AssessmentResultsService/results/06b4bfdf-aa41-4909-b417-56d6b8d01f8e/payload/1

Response = (ResultsPayloadDTO) … 2 through 6, and so on until done and last payload retrieved

And so on…

And can be requested with second "GET" call given the resultId and URL:

GET {spi domain}/api/AssessmentResultsService/results/06b4bfdf-aa41-4909-b417-56d6b8d01f8e/payload/0

Response = (ResultsPayloadDTO) …1

HealthMonitor Controller – API Workflow Example

The HealthMonitor controller is typically used for service debugging and diagnostic review.

GET {spi domain}/api/HealthMonitor

Response = REST Return code = 200 = OK
Service is running; any other response indicates service is not up or not responding.

GET {spi domain}/api/HealthMonitor/configuration

Response = (ServiceConfigurationDTO)
Information about the service's current configuration parameters.

GET {spi domain}/api/HealthMonitor/state

Response = (ServiceStateDTO)
Information about the service's DBMS connection state, version, and DBMS connection information for its Jobs repository.

Cleanup Controller – API Workflow Example

The Cleanup controller is typically used for service administration and management of the saved results and job caches. This controller will manage removal of selected results jobs and cached payloads, as well as any incomplete cache records that may have resulted from incomplete operations. It will take two calls to delete contents of the cache. One call will list the cache's IDs and information and the second call: /Confirmation?{use first call's parms here}

DELETE {spi domain}/api/Cleanup/All

Response = (confirmation query parms will be returned, which can be used to call the cleanup/confirmation end point to clean all job/cache information. Use the response string re-issued as the parameters in the /confirmation/ call below).

DELETE {spi domain}/api/Cleanup?resultId={myresultid here}

Response = (confirmation query parms will be returned, which can be used to call the cleanup/confirmation end point to clean a single job from the cache information. Use the response string re-issued as the parameters in the /confirmation/ call below).

DELETE {spi domain}/api/Cleanup/Obsolete

Response = (confirmation query parms will be returned, which can be used to call the cleanup/confirmation end point to clean any incomplete or obsolete (aged) cache information. Use the response string re-issued as the parameters in the /confirmation/ call below).

No obsolete job information will respond with this, meaning nothing left to do:

{ "confirmationUrl": "/api/results/Cleanup/confirm", "results": [], "blocks": [], "totalRecordsToBeDeleted": 0 }

DELETE {spi domain}/api/Cleanup/confirmation?{query parms used to delete single or multiple cache records}

Response = REST response code.

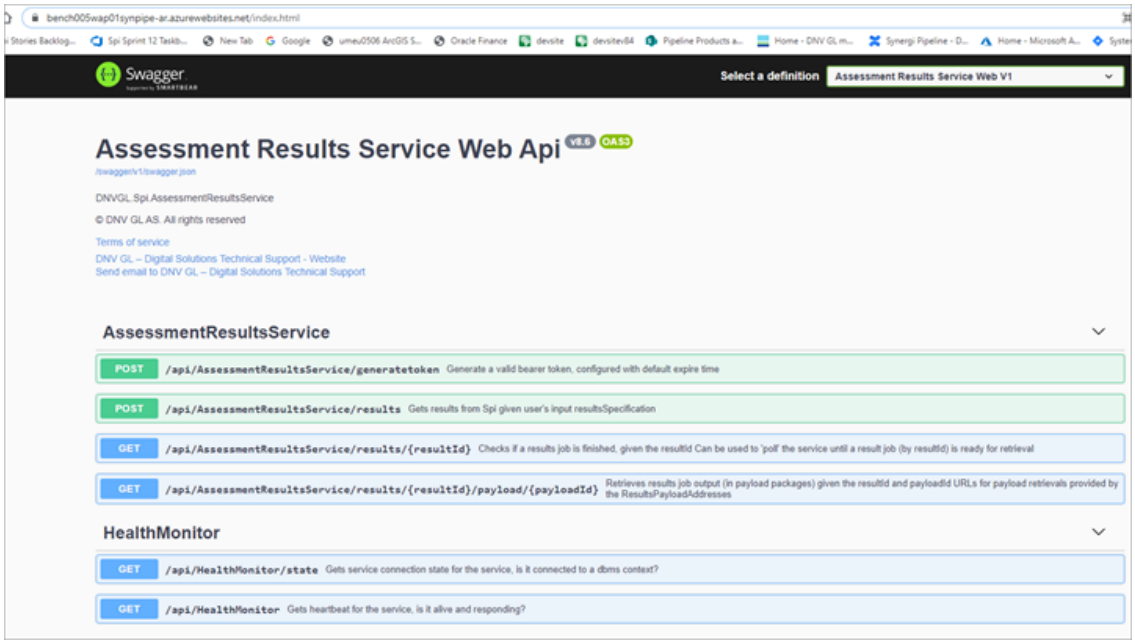
Appendix A: Mock Mode/Dummy Data Generation

This appendix describes how to use the sample API and mock/dummy data. Current outputs available in Mock form are limited to Risk and Analytical assessments.

When running with configuration setting IsMock = True, the service is not connected to any database and also has no memory of past calls or resultIds. All calls are stateless and all data generated is internal mockup data. ResultIds given are all automatically generated and are not validated between calls – you can send any ResultIds for now.

1. **Getting the API documentation (Swagger endpoint)**

   The default service endpoint displays the Swagger documentation:



2. **Generating your own bearer token**

   This function is controlled by settings in the appsettings configuration, and the username and password must match those configured as follows:

   "Startup": {

   "ValidateBearerTokens": "False",

"AllowBearerTokenGeneration": "True", //callers can ask the service to generate their own tokens

"GeneratedBearerTokenUserName": "MyUser", //callers user name to check if generating tokens

"GeneratedBearerTokenPassword": "MyPassword", //callers password name to check if generating tokens

"GeneratedBearerTokenExpHrs": 0, //generated tokens expiration period

"GeneratedBearerTokenExpMins": 5, //default 5 minutes

"GeneratedBearerTokenExpSecs": 0

},

POST/api/AssessmentResultsService/generatetoken

Post message body:

{

"userName": "MyUser",

"password": "MyPassword",

"expHrs": 0, //optional, if any of the three exp parms are specified this will override the expiration duration configured in the service

"expMins": 30, //optional

"expSecs": 0 //optional

}

Returned:

{

"token" : "Bearer eyJhbGciOiJIUzI1NiIsInR5cCI6IkpXVCJ9.eyJuYW1laWQiOiJBc3Nlc3NtZW50UmVzdWx0c0FwaUdlbmVyYXRlZC1NeVVzZXIiLCJuYmYiOjE2MTQ3ODA0OTIsImV4cCI6MTYxNDc4MjI5MiwiaWF0IjoxNjE0NzgwNDkyfQ.guUmrYXfJI09dVlUgKEzE-metXwRSi6DtxXU7HporsY" ,
"expirationDateTime" : "2021-03-03T14:38:14.5119531Z"

}

3. **Requesting a result**

   POST/api/AssessmentResultsService/results

   (ResultsSpecificationDTO)
   for example: can ask for each type in the ResultsType enum


```
{
   "resultsScope": {
     "modelName": "my model name",
     "resultsType": "RiskAssessmentApproved",
     "returnFormat": "json",
   },
 }
```


   In reality, you will receive resultsReady=false from this first call, and you would then (poll) and recall the query API in Step 4 until it returns resultsReady=true.
   For the dummy mockup, you will receive a resultsReady=true from this first call, and a payload address you can use in queries below.


```
{
 "resultsInfo": {
  "resultId": "033ed29f-5024-48d7-9cd0-5b2442eab5e5",
  "resultType": "RiskAssessmentApproved",
  "modelName": "my model name",
  "assessments": [
   {
    "id": "9b223c84-816a-4c6d-8efd-195819fd3043",
    "name": "approved assessment 1"
   },
   {
    "id": "865caedf-d799-4556-8eaa-13127a637574",
    "name": "approved assessment 2"
   }
```

```
 ],
 "startDate": "2021-03-03T14:34:09.157949Z",
 "endDate": "2021-03-03T14:36:14.157949Z",
 "elapsedSeconds": 125,
 "totalRecordCounts": [
  {
   "key": "analysisItems",
   "value": 12
  }
 ],
 "totalPayloadCount": 1,
 "resultsReady": true
},
"resultsSpecification": {
 "resultsScope": {
  "modelName": "my model name",
  "resultsType": "RiskAssessmentApproved",
  "returnFormat": "json"
 },
 "resultsFormulaGroups": [],
 "resultsKeyDataProperties": []
},
"resultsPayloadAddresses": [
 {
  "url": "/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0-
5b2442eab5e5/payload/0"
 }
]
```

}

4. **Querying if the result is ready**

   When resultsReady=false, this method is then used for polling until the service replies that its results are ready for extraction. So this method would go into a loop (for example, every 60 seconds), until it returns with resultsReady = true.

   GET/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0-5b2442eab5e5

   Using any request ID, you can test the poll method (called as shown in the example above). It will respond that results are ready and give the payload address you can use for Step 5.


```
{
 "resultsInfo": {
  "resultId": "033ed29f-5024-48d7-9cd0-5b2442eab5e5",
  "resultType": "RiskAssessmentApproved",
  "modelName": "my risk model",
  "assessments": [
   {
    "id": "401d7feb-9d13-441c-98fe-15cb670f8ca3",
    "name": "approved assessment 1"
   },
   {
    "id": "7d9af425-7a70-4ecd-b88a-4dc27df233ef",
    "name": "approved assessment 2"
   }
  ],
  "startDate": "2021-03-03T14:40:49.0930127Z",
  "endDate": "2021-03-03T14:42:54.0930231Z",
  "elapsedSeconds": 125,
  "totalRecordCounts": [
   {
    "key": "analysisItems",
```

```
      "value": 12
     }
    ],
    "totalPayloadCount": 1,
    "resultsReady": true
   },
   "resultsSpecification": {
    "resultsScope": {
     "modelName": "my risk model",
     "resultsType": "RiskAssessmentApproved",
     "resultsTypeOptions": [],
     "returnFormat": "json"
    },
    "resultsFormulaGroups": [],
    "resultsKeyDataProperties": []
   },
   "resultsPayloadAddresses": [
    {
     "url": "/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0-
5b2442eab5e5/payload/0"
    }
   ]
}
```

If you want to test your polling loop, you can force this call to return resultsReady=false. That way you could loop (for example, five times) with receiving false; then on the sixth call, make it respond as if results are ready, so you can break out of your loop and call for payloads as described in Step 5. To do this, put the "(TESTPOLL)" keyword into the ResultId guid parm:

GET/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0-(TESTPOLL)

It will return resultsReady=False to simulate the service still working on gathering results


```
{
 "resultsInfo": {
  "resultId": "033ed29f-5024-48d7-9cd0-(TESTPOLL)",
  "resultType": "RiskAssessmentApproved",
  "modelName": "my risk model",
  "assessments": [
   {
    "id": "7348cee5-efee-41ae-afa5-d1aa077d936e",
    "name": "approved assessment 1"
   },
   {
    "id": "77360ebe-44ca-4395-b6b6-58719fdcf8de",
    "name": "approved assessment 2"
   }
  ],
  "startDate": "2021-03-03T14:44:44.9556524Z",
  "endDate": "0001-01-01T00:00:00",
  "elapsedSeconds": 0,
  "totalRecordCounts": [],
  "totalPayloadCount": 0,
  "resultsReady": false
 },
 "resultsSpecification": {
```

```
  "resultsScope": {
    "modelName": "my risk model",
    "resultsType": "RiskAssessmentApproved",
    "resultsTypeOptions": [],
    "returnFormat": "json"
  },
  "resultsFormulaGroups": [],
  "resultsKeyDataProperties": []
 },
 "resultsPayloadAddresses": []
}
```


5. **Requesting a payload(s)**

   Simulated payloads can be requested anytime for testing. Even without requesting the result job be started in prior calls (as described in Step 3). Both types can be requested and the number of records returned in a given payload can be simulated for testing. By default RiskAssessmentApproved results will be returned. Also by default the number of records in total in one payload are controlled by configuration parameters in the appsettings configuration. The following example will simulate one payload with 12 records total and all in payload #1.


```
"Startup": {
  "IsMock": "True",
  "MockPayloadRecordCount": 12,
  "MockTotalRecordCount": 12,
```


   - Default – Returns Risk Assessment approved results and the number contained in the settings as shown in the previous example.

     GET/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0/payload/0

     Will return 12 records of ResultType= `RiskAssessmentApproved`

   - If you want to control the ResultType, you can simulate each resultType payload by putting keyword “(Analytical)” or “(Risk)” into the ResultId Guid for the call:

GET/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0 (analytical)/payload/0

Will return 12 records of ResultType=`AnalyticalAssessmentApproved`

- If you want to control the number of records of either type you receive in your payloads, you can simulate this by putting the keyword "({number})" (for example, (100)) into your ResultId Guid for the call:

  GET/api/AssessmentResultsService/results/033ed29f-5024-48d7-9cd0(100) (analytical)/payload/0

  Will return 100 records in this payload of ResultType= `AnalyticalAssessmentApproved`

For more information

For further information or to request assistance, contact your DNV Project Manager or DNV - Digital Solutions Technical Support at software.support@dnv.com.