

# Welcome to Northfield ACES

The Northfield Asset Coverage Expert System (ACES) makes it easy for your organization to understand its financial risk by using Northfield's Risk Models, Optimizer Software, and Data Services from a unified web services platform. This site provides login access, comprehensive developer documentation for webservice and application software developers, and architecture and technical information about the Northfield ACES Software Platform.

For more information about Northfield, Northfield's research, and sales enquiries, please visit [the Northfield home page](#).

## Single Sign On Service Access

ACES Model Desktop - for model data downloads.

ACES Developer Desktop - for optimizer and web service developers.

Section	Description
About Northfield ACES	An overview of the Northfield ACES webservice and software platform and its capabilities.
ACES Software Platform	Documentation about the Northfield ACES Software Platform that powers <a href="https://aces.northinfo.com">https://aces.northinfo.com</a> . The Northfield ACES Software Platform is also available for enterprise customers who want onsite deployment, or who want to integrate Northfield components into their own application servers.
API Documentation	ACES Services API Documentation.



# About Northfield ACES

The Northfield Asset Coverage Expert System (ACES) makes it easy for your organization to understand its financial risk by using Northfield's Risk Models, Software and Data Services from a unified web services platform.

The Key Features of the Northfield ACES platform are:

- The Model Service
- Analytics Services
- Data Services
- Programmer Tools
- Enterprise Software Deployment

## The Model Service

The Northfield ACES Model Service allows you to access Northfield Risk Model data while using an expert system to automatically solving complex asset data matching problems such as:

- Multiple identifier type lookups (Eg. CUSIP, SEDOL, TICKER).
- Identifier correction (Eg. Check digit provided/not provided).
- Identifier changes from corporate actions.
- Proxy generation for missing records .
- Custom record creation for the Northfield EE Model.

## Optimizer Service

The Northfield ACES Online Optimizer Service lets you:

- Optimize your portfolios using the Northfield Optimizer.
- Perform risk and performance calculations using our Risk Analytics Toolkit.

## Data Access

The Northfield ACES Data Access Service allow you to access Northfield and partner data:

- Download Northfield's risk model data files.



# Python/Webservice/Java Programmers:

The Northfield ACES Software Platform is accessible to Python, Webservice and Java programmers.

## NISACES Java API

The Java components and webservice model are documented in the "ACES Software Platform" section of this website. The full javadoc for the java API is available [here](#).

## NISACES Python API

NISACES provides a Python library that allows you to access Northfield ACES from your own Python programs. The NISACES library automatically manages secure connections to the Northfield servers and exports three modules that you can use in your own applications:

- `nisopt` - constructs input JSON for the NISOPT optimizer webservice API and provides helper functions to parse output JSON into useful reports.
- `nisaces` - constructs input JSON for the NISMDL model data webservice API. It makes model data available for your own analytics, and also manages automatic integration with the NISOPT optimizer webservice and the NISRAT Risk Analytics Toolkit webservices.
- `nishelperfunctions` - provides useful functions to interact with projects and files constructed by the Northfield Windows desktop optimizer application.

## NISACES Python Installation

The NISACES Python library is installed using "pip" so that all dependencies and the operating environment are setup automatically for you. We recommend installing NISACES in a virtual Python environment in the following manner.

```
python3 -m venv .venv/  
source .venv/bin/activate  
python3 -m pip install --upgrade pip  
python3 -m pip install https://saas.northinfo.com/wui/nisaces-5.0.0.tar.gz  
python3 <your program>.py  
deactivate
```



# The Northfield ACES Software Platform

## Overview

The Northfield ACES Software Platform is a suite of software tools developed by Northfield so it can provide a “Software As A Service” solution to clients that want to access Northfield data and analytics services via the cloud. The Northfield ACES Software Platform is the software that powers the services accessible from <https://aces.northinfo.com>.

Northfield has a diverse range of clients with diverse technology requirements. Some clients want full onsite software based solutions, some want a fully hosted cloud based solution, and some want to mix and match both cloud and onsite services. For example, a client may want to use a cloud query for risk model data, but run their portfolios with the Northfield Optimizer within a private network. Another client may have their own end user software and simply want to make web service calls. To achieve these requirements the Northfield ACES Software Platform uses a unique peer to peer architecture that allows clients to securely mix and match the services they use, where they use them, and where the data processing is performed.

The purpose of this document is to provide software Architects and Programmers with the information they need to understand and use the Northfield ACES Software Platform software.

## Architecture

The Northfield ACES Software Platform is implemented as a suite of java software components where each provides a public API via a java interface that allows programmers to configure and assemble the components to meet the specific needs of their applications. The components follow the [services layer pattern](#) and are 1 referred to as “Services”. The Services provided by the Northfield ACES Software Platform are shown in Table 1.

Table 1: Services

Service	Code	Description
Archive Service	ARC	Creates and distributes Northfield Risk Model data as archive files suitable for on-demand download and use by the SDK model component.
	CCS	The application management system that configures the business components for use in user applications.





# Archive Service (ARC)

## ARC Overview

The Model Archive Service (ARC) provides data to instances of the Northfield ACES Software Platform configured to provide a Model Service. For example, the Northfield ACES Software Platform Server running on <https://aces.northinfo.com/> implements the Model Service API, and it pulls its model data from the ARC server running in the same network. The Model Service is configured to request the appropriate archive file from the Archive Service when a model query is requested that the Model Service has not performed before. The file is downloaded, opened, indexed, and cached for the first and any subsequent calls.

The Archive Service provides the master set of files for a model on a date in a single archive. It will contain whatever files the model query requires on the requested date including:

- factor files
- correlation files
- exposure files (Ticker, Cusip, Sedol, Munis, Funds)
- ID cross indexes.
- Factor adjustment data
- exposure risk adjustment data
- A reference to the model date that the daily model adjusts
- Daily asset ID change data

The ARC Service allows User access to approved Archive Data Sets and lets the Model Service control User access to approved model configurations.

## ARC Operation

The Archive Service is available from the ARC tab on the SaaS web application, and archives can also be downloaded using the Web Service Interface.

## ARC File Formats

There are two ARC file formats:

- EOM files contain the factor, correlation and exposure sets as at the end of the month.



# Connection Service (CCS)

## CCS Overview

The Connection Service is the Northfield ACES Software Platform assembly and configuration service. Its role is to provide a simple interface over the complex requirements of creating and instantiating both client and server configurations of the other Northfield ACES Software Platform services. The ConnectionService: \* Provides a unified way to assemble Northfield ACES Software Platform components and manage their life-cycle requirements. \* Enables flexible configuration and licensing for different customer arrangements. \* Supports the modification and tuning of parameters within a client project.

## CCS Operation

User programs instantiate the NisConnect object and access any other Northfield ACES Software Platform services via the ConnectionService instance. This is shown in the following code from the samples.

```
Properties info = new Properties();
info.setProperty(NisConnect.CCS_BASE, base);
info.setProperty(NisConnect.CCS_MODE, mode);
ConnectionService ccs = new NisConnect(info);
try {
    ccs.open();
    ... use connection ...
} finally {
    ccs.close();
}
```

## CCS Configuration

The NisConnect constructor accepts a standard java Properties object that contains connection setting information:

- `ccs.mode` - NisConnect manages user program construction and assembly based on preconfigured modes. The mode is set by using one of the modes defined in `nis.app.asp.NisConnect`. These are explained in Table 4b.
- `ccs.base` - NisConnect expects a pre configured connection service directory that contains any binary and connection assembly resources. The base directory in the Northfield ACES Software Platform archive provides a standard `CCS_BASE` for use by all client installations.
- `ccs.logs` - To enable logs in the connection service in any mode set this property as "true".

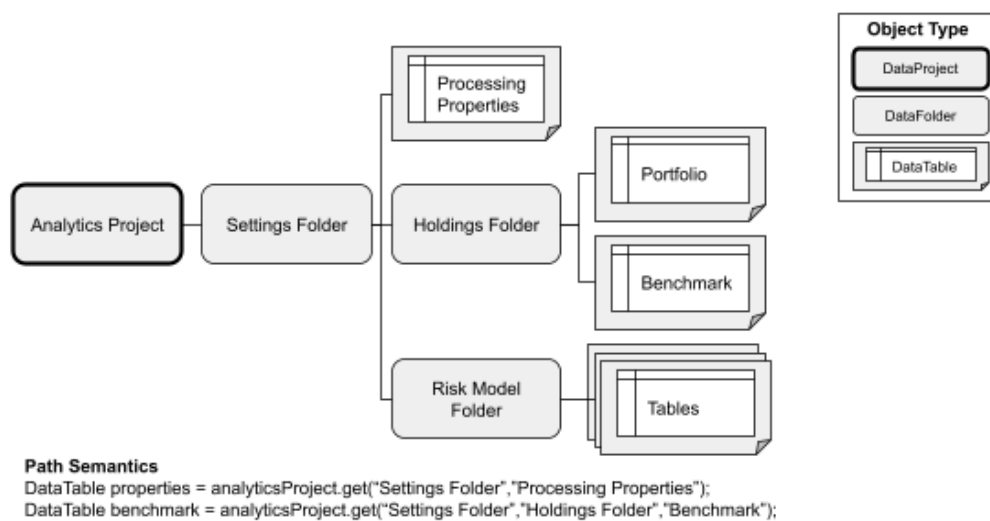


# Data Service (DAT)

## DAT Overview

The Data Service allows a User Program to make, save, and load DataProject objects. The DataProject model can be used to create a folder structure of tables that can be accessed by path semantics in the same manner as a file system. This is illustrated in Figure 3.

## Optimizer Project DataService Diagram



The benefits of the DataService are:

- A DataProject can be serialized and sent to another node for processing where it can be deserialized and processed. The process can add its own data and pass it on to another node, or return it to the original sender.
- The DataProject is able to be serialized into JSON form and is used to encode and decode data in the Web Services Interface.
- External data sources can be added to the DataService to provide access to table based data in User projects.
- CSV Files can be accessed and loaded by the User program into the DataService.

## DAT Operation

User Programs will normally use the DataService for accessing local and external data sources. External Data Sources are secured and identified by Data Project Codes. An example of data codes are shown in Table 5.



# Model Service (MDL)

## MDL Overview

The Model Service enables user programs to source and blend Northfield risk model data. This data can be used in the optimiser or in risk reporting and performance tools. The key features of the Model Service are:

- Online access to monthly and daily model data in compressed files that are organised and cross linked for easy retrieval and use in servers environments.
- Server based indexing, multiple data set searches, and automatic identifier cross referencing.
- Creating data sets for specific models and sets of securities.
- Blending risk models across different horizons. For example, blending annual and bi weekly horizons using monthly and daily risk model data.
- Custom exposure record proxy generation.
- Information about how an exposure record was matched.
- An online status report for model information and date ranges.

## MDL Operation

Model Product Codes Risk Models are secured and identified by Model Product Codes. An example of the model codes for the Australian model are shown in the following table.

### Australian Model Codes & Information

<b>ARC Code</b>	<b>Model Code</b>	<b>Name</b>	<b>Currency</b>	<b>Update Period</b>
010	nis-mdl-011	Australia Model - Monthly	AUD	EOM
010	nis-mdl-012	Australia Model - Bi Weekly	AUD	EOD

Access to model codes also needs to be granted and associated with your ccs.auth code provided to you by Northfield.





# Optimizer Service (OPT)

## Overview

The Optimizer Service provides a way for java programs to access the same software engine used in the Northfield Optimizer Desktop software. It is designed to provide an object model that follows the same tree structure as that used by the desktop software. This enables analysts and programmers to share a common model for defining and implementing analytics projects. Technically, the OptimizerService provides a java API on top of a system that performs the required mappings and transfer to and from the underlying C++ engine via the java native interface (JNI). The C++ engine is contained in a system library that is included in the CCS\_BASE area.

## OPT Operation

### Scenario Development

The Northfield Optimizer is designed as a multi purpose tool that supports user scenarios starting with simple risk analyses, portfolio optimizations based on user provided parameters, through to complex multiple optimizations that can estimate parameters. As a multi purpose tool with complex settings that does not constrain the ability of the user to explore their data, there is a high risk of user error in the configuration of inputs and interpretation of outputs. In order to minimize and manage errors, we recommend your user interface:

- Implements clearly defined scenarios that are prototyped in the desktop tool.
- Ensures datasets are present, complete and correct for the User scenario
- Ensures input values and parameters are within the ranges you have prototyped
- Only presents the User with the specific join/run function required for your scenario
- Produces output reports and tables that are relevant to the scenario.

It is beyond the scope of this document to describe the operations of the OptimizerService in detail, and the best way to determine the correct settings for an optimizer project is to create a desktop project and then map the fields you wish to set by referencing the GUI form names and mapping them to the same objects in the API Javadoc. Note that the Java API does not provide access to any of the file based methods of the underlying C++ API.

The Northfield support team is available to help you develop and test scenario prototypes, and the sample programs demonstrate how to organise and start an optimizer project.