OASIS Integration

HailAUS7

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Risk Frontiers

Email: info@riskfrontiers.com

Website: www.riskfrontiers.com

Tel:

Address, City, ST ZIP

Logo Name

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EXECUTIVE SUMMARY

This document provides detailed documentation of the integration of Risk Frontiers' Australian hail model, codename HailAUS7, into the Oasis Loss Modelling Framework. This integration is achieved through the use of the newly released Complex Model MDK which support the integration of a custom loss engine into the Oasis framework. Here is a summary of the capabilities and features of the integrated HailAUS7 model.

- HailAUS7 is a national severe hailstorm model for Australia. It is fully integrated into OasisLMF using the Complex Model MDK.

- The event set contains simulated hail events for 50,000 years featuring around 90M individual hail storm footprints.

- It features both static and dynamic motor vulnerability models which can simulate seasonal car movements and covered car spaces in major cities in Australia.

- The integrated model supports Open Exposure Data (OED) input exposures with any combination of GNAF ID (address), Latitude/Longitude, Postcode, ICA Zone and Cresta geolocation (see Section ??).

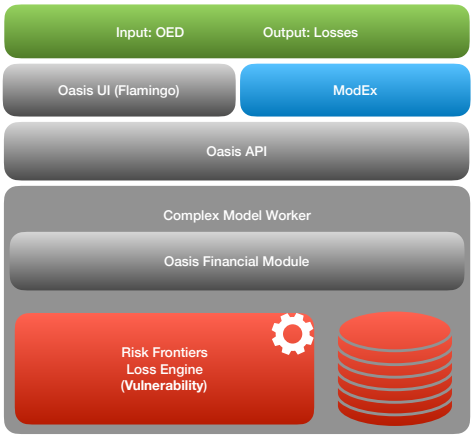
- All basic features and execution modes of Risk Frontiers Multi-Peril Workbench are supported. These include the Dynamic Motor execution mode, the Individual Risk Mode and the post amplification of losses using Demand Surge (see Section ??). In particular, it supports both the conventional single sample execution of Risk Frontiers models as well as the multi-sample requirement by the Oasis framework.

- The integration generates ground up losses that are validated to be practically indistinguishable from the Multi-Peril Workbench (see Section ??).

- Since this is an OasisLMF integration, we fully rely on the Oasis Financial Module and the validation of the integration is restricted to ground up losses.

GENERAL ARCHITECTURE

A general overview of the structure of the integration can be found in the following figure.



This is an implementation of the new Complex Model MDK from OasisLMF.

Oasis Loss Modelling Framework

The grey components are produced and maintained by the Oasis team. The Oasis UI is a web-based graphical interface providing visual access to the Oasis eco-system. The Oasis API is the main bridge between the frontend and backend components of the framework. The Complex Model worker is an instance of the oasis model worker responsible for performing loss sampling (via Monte Carlo simulation) and financial calculation. These are integrated into the ktools suite.

End user input/output

The green input and output are produced and consumed by the model end user. Only OED formatted inputs are currently supported.

ModEx Interface

The blue component is provided by ModEx as an alternative visual interface to the system. Note that a ModEx deployed installation is fully managed by the ModEx team.

Risk Frontiers model

Finally, the red loss engine and databases are provided and maintained by Risk Frontiers. They correspond to Risk Frontiers' dynamic vulnerability and stochastic event catalogue with associated metadata.

REQUIREMENTS

INSTALLATION

Deployment

To install the complex model integration of HailAUS 7, follow the following steps. Note that the integration has been tested on Ubuntu 18.04. The commands are exactly as follows for Debian system and they should work without any issue on any other flavor of Linux with appropriate modifications.

1. Install git, docker and docker-compose

```
sudo apt update && sudo apt install git docker docker-compose
```

2. Clone the repository

```
git clone https://github.com/risk-frontiers/OasisComplexModel.git
cd OasisComplexModel
```

3. **Optional**: change the user/password combination used to access the Oasis UI by chanding `OASIS_ADMIN_USER` and `OASIS_ADMIN_PASS` in `docker-compose.yml` if required.
4. Extract the model data and copy your license.txt into the model_data root folder
5. Copy model_data inside OasisCompexModel. The folder structure should be as follows

```
user@ubuntu:/var/oasis/OasisComplexModel$ tree
.
├── complex_model
│   └── Risk.Platform.Core
├── rf_install.sh
├── model_data
│   ├── license.txt
```

6. Run the deployment script

```
./rf_install.sh
```

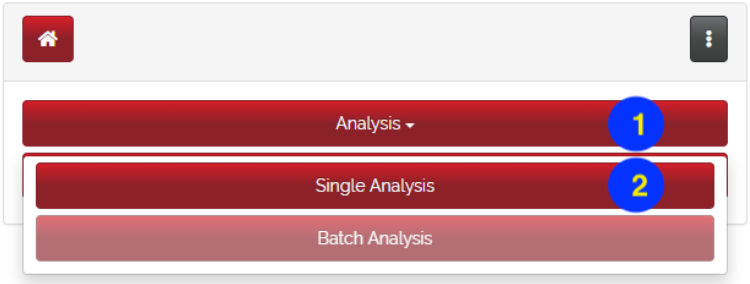
7. Open a web browser from a computer attached to the network and navigate to http://<server>:8080/app/BFE_RShiny to access the Oasis UI interface (<server> should be replaced with the IP address or hostname of the server where the complex integration was deployed.

Analysis through the Oasis UI

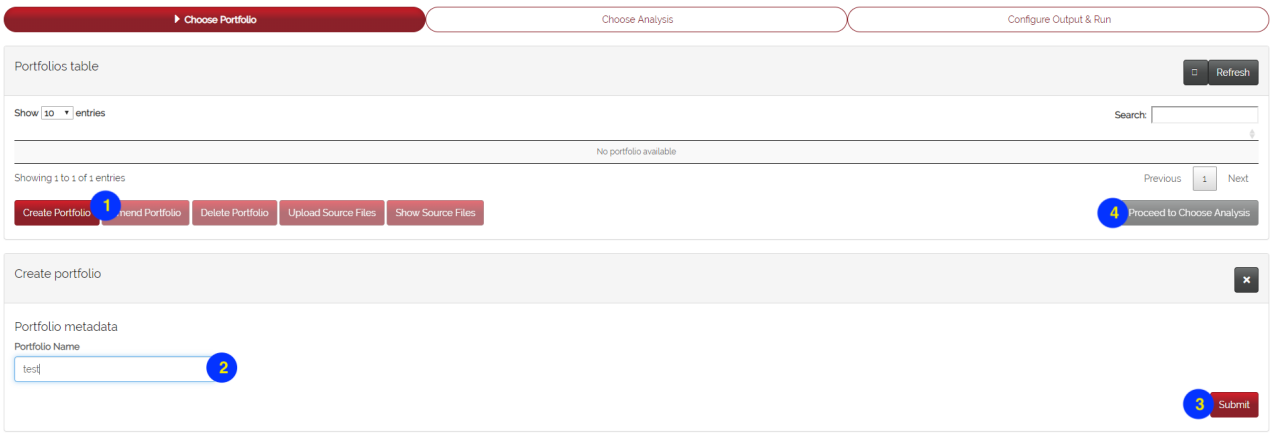
To run an analysis on, follow the following steps. To start an analysis, you need at least an input location file formatted according to the Open Exposure Data specification. Our integration only accepts OED input files and a sample location file can be found in our repository.

1. Navigate to http://<server>:8080/app/BFE_RShiny and enter admin:password as the default admin and password (or use the combination set during deployment).

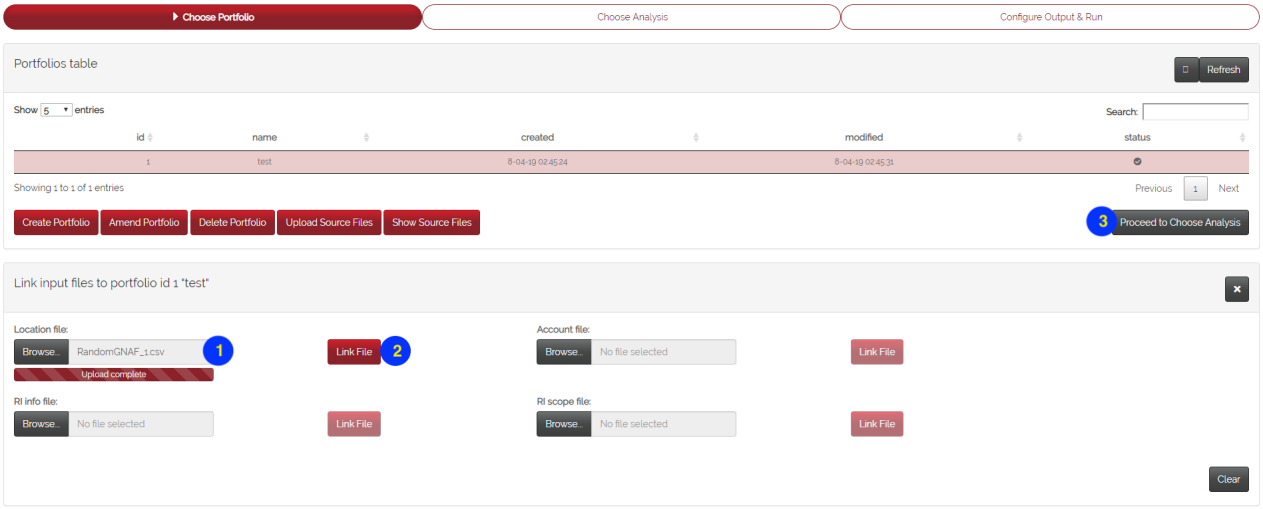
2. Create an analysis by selecting **Analysis → Single Analysis** on the left-hand side panel.



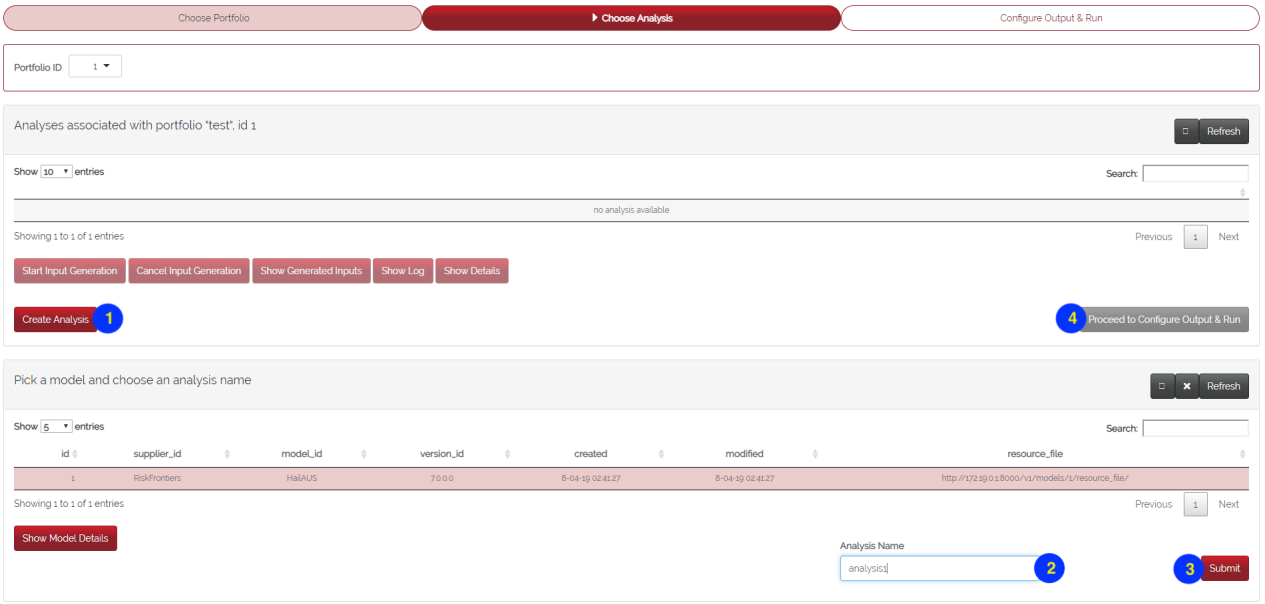
3. We now need to create a portfolio.



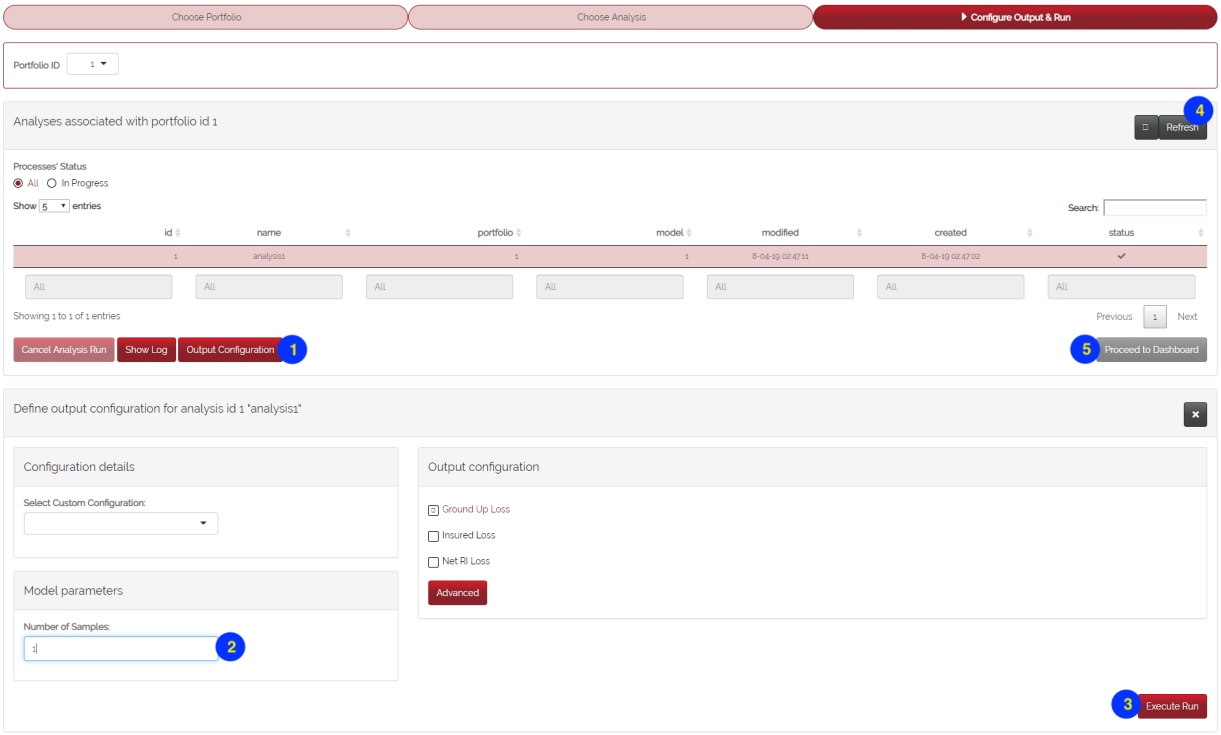
4. Upload the location, account and reinsurance files.



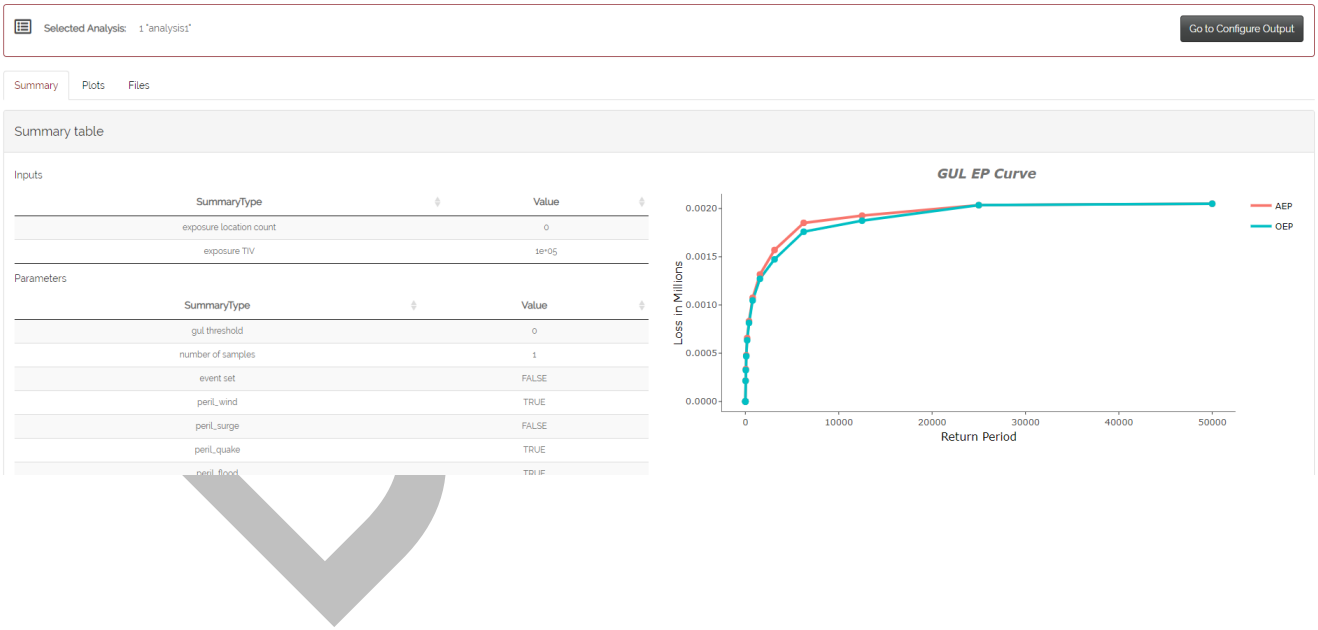
5. Create an analysis.



6. Configure the model run and then click **Execute**.



7. Visualize the output



INPUT EXPOSURE

OED 101

OED fields and Risk Frontiers location features

OED conversion tables

IMPLEMENTATION DETAILS

APPENDIX