Realtime System - Run Book

# Business Benefit

MSCI Real Time Indices provide access to real-time index levels for over 3,000 benchmark indices, including the market-leading MSCI EAFE, MSCI ACWI and MSCI Emerging Markets Indices. Used by both portfolio managers and equity traders, MSCI Real Time Indices offer a unique, minute-by-minute picture of equity market activity - across the globe - and across markets, sectors, countries or regions.

# Overall Architecture

## Architecture



Server and port information

Below are the server and port no that will be used by real time:

|  |  |  |  |
| --- | --- | --- | --- |
| Server | Server alias / hostname | Server port | Administrative port |
| Calculator server | mscirtmgv, mscirtbgv, mscirtmnv, mscirtbgv | 20060 | NA |
| Index server | mscirtmgv, mscirtbgv, mscirtmnv, mscirtbgv | 20041 | 20049 |
| XMF server | mscimfmgv, mscimfsgv, mscimfmnv, mscimfsnv | 20051 | 20059 |
| Ondemand web | mscimfmgv, mscimfsgv, mscimfmnv, mscimfsnv | 20055 | NA |
| RMDS P2PS | mscidsmgv, mscidsbgv, mscidsmnv, mscidsbgv | 15991 | NA |
| Automatic snapshot | mscimfmgv, mscimfsgv, mscimfmnv, mscimfsnv | 20050 | NA |
| Web quote (DMZ) | giplda080.dmz.msci.com, gsplda080.dmz.msci.com (Please contact Antony Tittle for deployment) | NA | NA |
| Web quote (INT) | mscimfmgv, mscimfsgv, mscimfmnv, mscimfsnv  F5  Nevada: 144.203.103.111  Geneva: 144.203.88.085 | 34480 | NA |
| Pricing server | mscirtmgv, mscirtbgv, mscirtmnv, mscirtbgv | 20071 | 20079 |
| Datasource service | mscimfsgv, mscimfsnv | 20091 | 20099 |

Oracle Server Information

|  |  |  |
| --- | --- | --- |
| Alias | Server Address | Server port |
| GNPO\_REALTIME1 | GNPOUN04 | 7000 |
| NVPO\_REALTIME1 | NVPOUN01 | 7000 |

Oracle JDBC URL for MSCI Env Driver

|  |  |
| --- | --- |
| Alias | URL |
| GNPO\_REALTIME1 | jdbc:msci:oracle.jdbc.driver.OracleDriver:GNPO\_REALTIME1:oracle:rtappLN\_prod? |
| NVPO\_REALTIME1 | jdbc:msci:oracle.jdbc.driver.OracleDriver:NVPO\_REALTIME1:oracle:rtappNY\_prod? |

## Data flows

# End users

Real time managers will be the end users of the system.

**Hong Kong**

May Hong, Bill Chau, Cathy Siu, Wilson Wong

**New York**

Julieta Ugaz Pereda, Joe Pang, Stephen Spurrier, Eric Askins, Zachary Kroner

**Geneva (Backup)**

Marie Claire Chabert, Eric Mamie

# Business owner

Julieta Ugaz Pereda

Backup: May Hong

# IT owner

Thomas Chan

Backup: Robert Leung, Ray Siu, Tree Lam

# Daily usage

RT managers will start the calculator application before the opening of New Zealand and they will load the basefile to start a new calculation. The calculator will get real time price/spot incoming feed from RMDS, and the calculated index values will be sent to XMF servers. XMF servers will then publish the real time data to data vendors using XMF protocol.

At the same time, the published indices will be stored in On Demand database for ondemand query by data vendors or other applications (e.g. XMF Settlement web application).

All RT application components and vendor connections will be monitored by Real time dashboard and it also allows the users to control the failover of calculator servers.

Please refer to Operation section regarding the operation hours.

# Compliance

## Transparent promotion process

The following environment variables have been used in Linux servers.

|  |  |  |
| --- | --- | --- |
| Environment Variable | Values | Description |
| SYS\_LOC | For NV:  mft.nv.na  For GV: mft.gv.eu | For backward compatible.  Ondemand logger will use this variable to determine which database to use for storing the RT ticks. |
| RT\_ENV | prod/test | The environment status for RT applications |
| TZ | GMT | Standardize the logging time zone for RT |
| IPSDB | GNP\_MSCIE1 | THE IPS database to update the dividend status in RT manual and automatic snapshots |
| IPSMODE | prod/test | The environment status for IPS |
| ENV | prod/test | The environment status for RT applications |
| LOCATION | gv/nv | The location of the RT applications |

The following environment variables have been provided to IPS environment for their Oracle database access.

|  |  |  |
| --- | --- | --- |
| Environment Variable | Values | Description |
| REALTIME\_GV\_DB | GNPO\_REALTIME1 | The Oracle instance for RT in Geneva |
| REALTIME\_GV\_DB\_USER | rtappLN\_prod | The Snoopy user for accessing REALTIME\_GV\_DB |
| REALTIME\_NV\_DB | NVPO\_REALTIME1 | The Oracle instance for RT in Nevada |
| REALTIME\_NV\_DB\_USER | rtappNY\_prod | The Snoopy user for accessing REALTIME\_NV\_DB |

## BCP compliance

#### BCP for Real time calculator server

There are 2 cold standby BCP calculator servers. One of them is located in GS and the other one is located in NAP7. If both main calculator (hot) and standby (hot) calculator failed to calculate and distribute index data, the BCP calculator can be started by RT manager and in xrt4 PC and take over the calculation. RT manager are required to switch the BCP calculator as main and so that the index will be published to the XMF Servers.

#### BCP for XMF server

There are 2 hot standby XMF servers. One of them is in GS and the other one is in NAP7. Data vendor will not connect to these 2 standby servers unless the cluster of XMF servers is failover to the hot standby server.

#### BCP for Real time monitoring

The real time room in Hong Kong and New York is the main production site. Geneva office will be the BCP site.

# Deployment & Dependencies

The Realtime system applications have been deployed to following location. Please refer to the individual classpath file for corresponding dependencies.

|  |  |
| --- | --- |
| Application | Path |
| Real time calculator | /ms/dist/msci/mcrt |
| XMF server | /ms/dist/msci/xmf2 |
| Ondemand web | /ms/dist/msci/OnDemandWeb |
| Real time Dashboard | /ms/dist/msci/RealtimeDashboard |
| Real time Dashboard (Web) | /ms/dist/msci/RealtimeWebMonitoring |
| Ondemand Logger | /ms/dist/msci/OnDemandLogger |
| Automatic Snapshot | /ms/dist/msci/datasource |
| IndexMonitor | /ms/dist/msci/mcrt-tools |
| XMF settlement web | /ms/dist/msci/rtIndexApp |
| Data source comparator (DSC) | /ms/dist/msci/DSC |
| Web XMF server | /ms/dist/msci/webquote  /ms/dist/msci/webquoteext (for public web server) |
| Pricing Server | /ms/dist/msci/IntegrationAPI |
| Datasource service | /ms/dist/msci/datasource |

# Applications that depends on this system

The following applications depend on RT system:

#### Calculator’s Manual Snapshot

Manual snapshot files are generated by the Real Time Calculator which take a snapshot of RT prices, indices and spot rate. EOD cycle will take these data to perform data loading and QA.

The following script is used for copying manual snapshot files generated by real-time calculator to IPS production environment. Two types of manual snapshot are being copied to mscipapp1, they are

Usage: df\_ftp\_rt\_files host remote\_file

Example: df\_ftp\_rt\_files mscirtmln 0425amer.IDX

SCP is being used to copy the files

Remote source: /u/mcrtprod/out/[mmdd][cycle name].IDX

Target: $MSCIARCH/snapshots/[mmdd][cycle name].IDX (e.g. /u/msci\_arch/snapshots/0425amer.IDX)

Once they are copied to mscipapp1, data in the files will be loaded to IPS database by rt\_load\_data.

When user closes the market and takes the manual snapshot, RT will update the realtime security dividend status, either Accept or Postpone depending on the market status, the security trade status, and the dividend status, to IPS. Only the main calculator can update the status to IPS. Following figure shows the process flow:

#### Automatic Snapshot

Automatic Snapshot files are generated by the Automatic Snapshot application. This application will take a snapshot of Real time security price at predefined schedule and the price will be loaded to IPS. If the security is monitor by RT calculator, then the price in calculator has a higher precedence than the snapshot price is automatic snapshot.

The production URLs are:

Geneva: <http://mscimfvgv:20055/web/monitoring.html>

Nevada: <http://mscimfvnv:20055/web/monitoring.html>

During various Prom cycles, the files are transferred from the Real Time servers to the IPS server ( mscipapp1) for loading the into the IPS database

df\_ftp\_snapshot\_files

This script is used for copying automatic snapshot files generated by Automatic [SnapshotService](http://eu-twiki01.int.msci.com:8080/bin/view/MSCIBarra/SnapshotService) to IPS production environment. PRC file will be generated and stored in the directory /u/mcrtprod/out of mscimfvln/mscimfvny.

It will first try to obtain snapshot file from mscimfvln, if it fails to obtain the file, it will switch to mscimfvny to get the file.

Usage: df\_ftp\_snapshot\_files remote\_file

Example: df\_ftp\_snapshos\_files 0425inap.PRC

SCP is being used to transfer the files:

Remote source (primary: mscimfvln, secondary: mscimfvny) : /u/mcrtprod/out/.PRC

Target: $MSCIARCH/snapshots/.PRC (e.g. /u/msci\_arch/snapshots/0425inap.PRC)

Once they are copied to mscipapp1, data in the files will be loaded to IPS database by rt\_load\_data.

When user validates the end-of-day (EOD) automatic snapshot, including JPAN, CHNA, ASIA, CLOS and AMER, RT will update the non-realtime security dividend status, either Accept or Postpone depending on the market status and the security trade status, to IPS. Suppose user will only validate the snapshot in GV. Following figure shows the process flow:

#### Forex and Forward data extraction

EOD cycle will make use of this process to take the WM spot and forward rate for index calculation. The following scripts are invoked from calc\_engine\_new.mnu by Prom on mscipapp1 for creating the FX rates files in /u/ipsoutput/forex/. The files created are wmfx.txt and fwwm.txt.

/ms/dist/msci/PROJ/datasource/prod/scripts/extract\_fxrates -Vprod -Td -O$fx\_spot\_path -D'$extwmd\_date' -R'$extjdist'

e.g. /ms/dist/msci/datasource/prod/scripts/extract\_fxrates\_MNET -Vprod -Td -O/u/ipsoutput/forex -D'JAN 7 2008' -Rmscidsbgv

/ms/dist/msci/PROJ/datasource/prod/scripts/extract\_fxrates -Vprod -Tf -O$fx\_fw\_path -D'$extwmf\_date' -R'$extjdist

e.g. /ms/dist/msci/PROJ/datasource/prod/scripts/extract\_fxrates -Vprod -Tf -O/u/ipsoutput/forex -D'JAN 7 2008' -R'mscidsbgv'

#### DEKA and Allianz Midday Snapshot

This Cron task is used for the creation of a custom product required by two clients, DEKA and Allianz. They are called "Midday" snapshot because these products are calculated using an intraday snapshot price, similar to DWS. However, in this case they were implemented as a number of real time indices. The values of the real time indices at a particular point of time in the day are retrieved from the recap files and packaged as a product.

This script invokes another script called xmfRecaps2eds.sh. The script runs a Java class called com.msdw.msci.xmf.settlement.EDSExtract. It receives a long list of parameters including the date, time, name of input and product files and list of all indices that needs to be included in the file.

EDSExtract looks at the XMF OD Recaps file in /var/xmf/recaps/allindices.main and extract the index level in the file for the indices at the time specified.

It generates files in the directory /u/mcrtprod/ipsoutput/elec\_dist/ED\_GEN which are required by the [ProM](http://eu-twiki01.int.msci.com:8080/bin/view/MSCIBarra/ProM) step "trxmfxt". The files are called /u/mcrtprod/ipsoutput/elec\_dist/ED\_GEN/D\_18.06\_ and /u/mcrtprod/ipsoutput/elec\_dist/ED\_GEN/D\_21.90\_ respectively.

Runs on: XMF Server, LN campus only

02 11 \* \* 1-5 /ms/dist/aurora/bin/krun -- /u/mcrtprod/bin/middayExtract

# Applications that this system depends on

RT system has the following dependencies:

#### Real time data

RMDS is the main real time data source for index calculation.

#### Portfolio generation

Portfolio generation is triggered by Prom EOD cycle. Before we can generate the portfolio data, EOD cycle must be completed.

The portfolios are now generated by the genbasefile script in the *BenchmarkPortfolioLoader* project, for example:

/ms/dist/msci/BenchmarkPortfolioLoader/${IPSMODE}/scripts/genbasefile\_MNET -V${IPSMODE} -J"-D ${YYYYMMDD\_early} -G IN" -M"-Xmn2048m –Xmx3072m -Dlogroot=/tmp –DRT\_ENV=${IPSMODE}"

/ms/dist/msci/BenchmarkPortfolioLoader/${IPSMODE}/scripts/genbasefile\_MNET -V${IPSMODE} -J"-D ${YYYYMMDD\_early} -G TM" -M"-Xmn2048m –Xmx3072m -Dlogroot=/tmp –DRT\_ENV=${IPSMODE}"

The DWS SEC file is now generated in eds\_prom.mnu IPS script:

/ms/dist/msci/BenchmarkPortfolioLoader/${IPSMODE}/scripts/genbasefile\_MNET -V${IPSMODE} -J"-D ${YYYYMMDD\_early} -G DWS –S SEC" -M"-Xmn2048m –Xmx3072m -Dlogroot=/tmp –DRT\_ENV=${IPSMODE}"

For a list of available index groups for the -G parameter, please refer to /com/msdw/msci/BenchmarkPortfolioLoader/resources/com/msci/realtime/portfolio/portfolio\_config.properties of the *BenchmarkPortfolioLoader* project.

The portfolios are written into GV and NV Oracle databases.

#### IDF generation

IDF generation is triggered by Prom EOD cycle. World cycle index calculation must be completed before we can generate the IDF file.

IDF will be generated in /u/ipsoutput/basefile/YYYYMMDD\_idf1.xmf of mscipapp1. It is generated by the following script:

/ms/dist/msci/BenchmarkPortfolioLoader/${IPSMODE}/scripts/genIDFfile\_MNET -V${IPSMODE} -J"-D ${YYYYMMDD\_early}" -M"-Dlogroot=/tmp –Xmx1536m –Xmn1024m"

After the IDF file is generated, it needs to be sent to Geneva and Nevada XMF servers and notify the data vendors. It can be done by injectIDFWrapper.pl.

This Perl script sends the IDF files from mscipapp1 to the XMF server in Geneva and Nevada. It then invokes a script called sendIDF in the xmfng project to send the Index Description Files (IDF) for Reuters via XMF.

Usage: injectIDFWrapper.pl -f remote\_file [-v prod|test]

Example: injectIDFWrapper.pl -f /u/ipsoutput/basefile/20080425\_idf1.xmf

Remote Source: $IPS\_OUTPUT/basefile/[yyyymmdd]\_idf1.xmf

Target: /var/xmf/indexes/[yyyymmdd]\_idf1.xmf.main

# Operations

## User operations hours

Summer time: 20 hours and 50 minutes of contribution

Contribution of index levels

• Starts at 8.00pm NY time (8.00am HK time / 2:00am GV time)

• Stops at 4.50pm NY time (4.50am HK time / 10.50pm GV time)

Winter time: 22 hours and 30 minutes of contribution

Contribution of index levels

• Starts at 6.00pm NY time (7.00am HK time / 12.00am GV time)

• Stops at 4.30pm NY time (5.30am HK time / 10.30pm GV time)

## GCC Cycle

Saturday 12pm GMT - 3pm GMT

Sunday 3pm GMT - 4pm GMT

## Start entry

For Calculator Servers, they are kicked off by the Realtime manager daily. For other servers, they are started automatically after the machine is rebooted every weekend by the init entries.

## How to start

Each server has its own start up script. Once the startup script is executed, the server will be kicked off.

|  |  |
| --- | --- |
| Service | Start up script |
| Calculator Server | /u/mcrtprod/bin/startMCRTServer |
| Index Server | /u/mcrtprod/bin/startIndexServer |
| XMF Server | /u/mcrtprod/bin/startXMF2Server |
| On Demand Logger | /u/mcrtprod/bin/startODLogger |
| On Demand Web | /u/mcrtprod/bin/startOnDemandWeb |
| RT Index Application | /u/mcrtprod/bin/startRTWeb |
| Snapshot Service | /u/mcrtprod/bin/startSnapshotService |
| Web XMF server | /u/mcrtprod/bin/startWebquote |
| Pricing Server | /u/mcrtprod/bin/startPricingServer |
| Datasource service | /u/mcrtprod/bin/startDatasourceServer |

## How to stop

Each server has its own stop script. Once the stop script is executed, the server will be stopped.

|  |  |
| --- | --- |
| Service | Stop Script |
| Index Server | /u/mcrtprod/bin/stopIndexServer |
| XMF Server | /u/mcrtprod/bin/stopXMF2Server |
| On Demand Logger | /u/mcrtprod/bin/stopODLogger |
| On Demand Web | /u/mcrtprod/bin/stopOnDemandWeb |
| RT Index Application | /u/mcrtprod/bin/stopRTWeb |
| Snapshot Service | /u/mcrtprod/bin/stopSnapshotService |
| Web XMF server | /u/mcrtprod/bin/stopWebquote |
| Pricing Server | /u/mcrtprod/bin/stopPricingServer |
| Datasource service | /u/mcrtprod/bin/stopDatasourceServer |

## Status or health checks

Each server has its own status checking script. Once the status checking script is executed, the server status will be reported in the console.

|  |  |
| --- | --- |
| Service | Status Checking Script |
| Index Server | /u/mcrtprod/bin/statusIndexServer |
| XMF Server | /u/mcrtprod/bin/statusXMF2Server |
| On Demand Logger | /u/mcrtprod/bin/statusODLogger |
| On Demand Web | /u/mcrtprod/bin/statusOnDemandWeb |
| RT Index Application | /u/mcrtprod/bin/statusRTWeb |
| Snapshot Service | /u/mcrtprod/bin/statusSnapshotService |
| Web XMF server | /u/mcrtprod/bin/statusWebquote |
| Pricing Server | /u/mcrtprod/bin/statusPricingServer |
| Datasource service | /u/mcrtprod/bin/statusDatasourceServer |

## Log files

Each server has its own log file, which will be rolled to a new one every day. The location of each log file is shown as follows.

|  |  |
| --- | --- |
| Service | Log File Location |
| Calculator Server | /var/mcrt/log/mcrtserver/mcrt\_server.log |
| Index Server | /var/mcrt/log/indexserver/idxserver.log |
| XMF Server | /var/xmf/log/xmfserver/XMFServer.log |
| On Demand Logger | /var/xmf/log/ondemandlogger/ondemandlogger.log |
| On Demand Web | /var/xmf/log/ondemandweb/ondemandweb.log |
| RT Index Application | /var/xmf/log/rtIndexApp/rtIndexApp.log |
| Snapshot Service | /var/mcrt/log/snapshot-service/snapshot-service.log |
| Web XMF server | /var/xmf/log/webquote/xmfweb.log |
| Web Monitor | /var/xmf/log/webmonitor/webmonitor.log |
| Pricing Server | /var/mcrt/log/pricingserver/pricingserver.log |
| Datasource service | /var/xmf/log/datasourceserver/datasourceserver.log |

## Main configuration files

Standalone servers (not web applications) have its own configuration file, which are stored in the following locations.

|  |  |
| --- | --- |
| Service | Log File Location |
| Calculator Server | /u/mcrtprod/conf/msci/mcrt/app.ini |
| Index Server | /u/mcrtprod/conf/msci/xmf2/indexserver.ini |
| XMF Server | /u/mcrtprod/conf/msci/xmf2/xmfserver.ini |
| On Demand Logger | /u/mcrtprod/conf/msci/ondemandlogger/ondemandlogger.ini |
| Snapshot Service | /u/mcrtprod/conf/msci/datasource/app.ini |
| Datasource service | /u/mcrtprod/conf/msci/datasourceserver/datasourceserver.ini |

# Maintenance Window

Real time system has the following maintenance window:

### MNET server maintenance window

**Monday – Friday**

17:00 – 17:30 NYT

**Saturday**

00:00 GMT – 12:00 GMT

15:00 GMT – 23:59 GMT

**Sunday**

00:00 GMT – 15:00 GMT

16:00 GMT - 22:00 GMT

### Data vendor network maintenance window

**Monday – Friday**

17:00 – 17:30 NYT

**Friday**

21:00 NYT onward

**Saturday**

Full day

**Sunday**

00:00 GMT – 22:00 GMT