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INSURANCE

Oracle® Insurance Group Policy Administration

Data Intake Solution

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INTRODUCTION

This document describes the solution proposed by Oracle Insurance for importing and processing files that are received by an insurance carrier from Group Customers.

UNDERSTANDING DATA INTAKE

Data Intake is the process of receiving files from Group Customers for the purpose of importing data into the Oracle Insurance Policy Administration system (OIPA). The data in the files may result in many changes, including but not limited to the following:

- Adding a new member to the system

- Changing an Employee's elected coverage

- Adding a dependent to a coverage

- Enrolling a member and dependents

- Auto-cancelling coverage for a member

- Updating member information in the system

FILE TYPES

FILE CONTENT
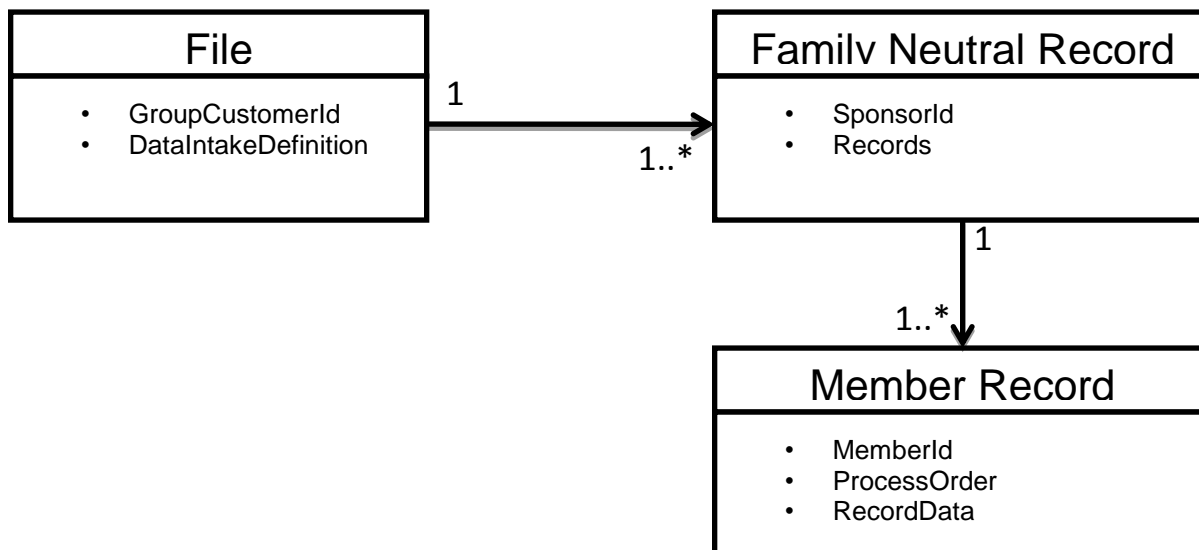
Every File that is received by an insurance carrier is comprised of a set of Family Records. The File contains an identifier for the Group Customer that submitted the file. Each Family Neutral Record contains the information that needs to be processed for a Member of the Group Customer. The Family Neutral Record contains an identifier that can be used to uniquely identify the employee/primary participant/sponsor for the Group Customer. It is comprised of a set of Member Records.

Records are grouped together by Primary Participant / Employee / Sponsor to form what is called a "Family Neutral Record" (FNR) identified by the Sponsor ID, which could be the Sponsor Tax ID or Employee ID. Each FNR is comprised of a set containing one or more records containing information about the Employee or one of the Employee's dependents. It is possible that more than one record exists in the same FNR for the same member (employee or dependent), on the same file. In order for OIPA to be able to process multiple records pertaining to the same individual member, a process order must be specified that dictates the order of processing for the records within the FNR. Each record in an FNR contains the same fields; however, it is possible that some fields will not be populated. For example, the "Salary" field would be populated for an employee of the group customer, but would not be populated for the spouse or child of the employee.

An example of an FNR follows. In this example, a single FNR pertains to a sponsor with an id of ABC1000 whose name is Frank Smith. He has a wife, Donna, and a child, Bobby.

In the FNR, there are multiple records pertaining to the employee or one of his dependents. This information comes in on the same file for the sponsor Frank Smith.

MemberID	Seq	Last	First	Gender	RelCd	AddrTyp	Line1	JobStat
ABC1000	1	Smith	Frank	M	E	H	1 Main	A
ABC1000	2	Smith	Frank	M	E	H	2 Tree	A
ABC2000	3	Smith	Donna	F	W	H	1 Main	
ABC2000	4	Smith	Donna	F	W	H	2 Tree	
ABC3000	5	Smith	Bobby	M	C	H	1 Main	
ABC3000	6	Smith	Bobby	M	C	H	2 Tree	

In the example above, it is possible that each record for Frank Smith contains changes. OIPA must be able to process changes for both records pertaining to Frank Smith, in the process order specified. If the First record for Frank Smith had an address change, and the second record had a coverage change, both changes would have to be processed in the system; the address change would be executed first before the coverage change.

FILE TYPES

There are different types of files that can be received by an insurance carrier for processing. In addition, each type of file may contain different Record Types and result in different processing.

Participation File

In a Participation File, only eligible members who have elected to participate in coverage are included in the file. The insurance carrier is instructed as to the end state by the Group Customer. The Participation File will contain data for both Eligibility and Enrollment. The Group Customer does all of the record keeping, and OIPA can simply assign an employee to eligibility classes and enroll them without a requirement to validate. The net result of processing a Participation File is that Eligibility and Enrollment updates will be applied. For example, for a new member:
- the member information will be stored (client / address),

- the member employment information will be stored (salary, position),

- the member will be placed in eligibility classes (union vs. non-union, salaried vs. contractor)

- the member's dependents will be stored (client / address),

- the member and/or dependents will be enrolled in the coverage selected (policies, segments)

Eligibility File

In an Eligibility File, only eligible members from a Group customer are included in the file. Other members who are not eligible for coverage are not included. An Eligibility File falls into one of two sub-types:

- Eligible with eligible class specified in the file. For this sub type, the Group Customer is telling the insurance carrier what classes a member is eligible for; the file will contain both member info and classes.

- Eligible without eligible class specified in the file. For this sub type, OIPA will need to calculate the classes the member is eligible for; the file will only contain member info.

For both sub-types, OIPA will need to calculate the eligibility classes based on the member information provided. If the file specifies classes then OIPA will validate the classes provided. If the file does not specify classes, then OIPA will calculate the eligibility classes. The net result of processing an Eligibility File is the placement of the member into one or more eligibility classes in OIPA.   For example, for a new member:

- the member information will be stored (client / address),

- the group membership information will be stored (salary, position),

- the member will be placed into eligibility classes (union vs. non-union)

When receiving an Eligibility file, OIPA will not automatically enroll the members in the file

Population Files

Population files contain all or any subset of a Group Customer's members irrespective of whether or not they are eligible for coverage. No Eligibility determination is made by the Group Customer. Population Files are sometimes referred to as Universe files. Since the Group Customer does not send any eligibility information on a Population file, OIPA will always need to calculate eligibility. The net result of a Population File is the same as an Eligibility File; the member will be placed into one or more eligibility classes in the system. For example, for a new member:

- the member information will be stored (client / address),

- the employment information will be stored (salary, position),

- the member will be placed into eligibility classes (union vs. non-union)

There is no requirement to process enrollment for a Population File.

FAMILY RECORD TYPES

There are two different kinds of records that can be received on any of the File Types.

Changes Only Record Type

In a Changes Only File, OIPA will receive records for only those sponsors / employees / primary participants who have changes that need to be applied to OIPA. OIPA will need to calculate what information has changed in the record. For Changes Only Files, it is presumed that all FNRs that are received have some change in them; therefore, OIPA does not need to calculate missing FNRs. For example, if there are 500 FNRs on a file, there are presumed to be changes for all 500 FNRs.

Full Record Type

The File only contains all FNRs from a Group Customer, irrespective of whether or not there are changes in the FNR. In this scenario, it is incumbent on OIPA to inspect every FNR to determine if there are changes. For example, if there are 1000 FNRs on a file, it is possible that there are only changes in 100 of the FNRs, and the other 900 FNRs have no changes that need to be applied.

FILE TYPE MATRIX

The following table describes the different file type combinations and the expected responsibilities for OIPA.
- Member Info includes client, address, group customer membership info, dependent client and address info

- Eligibility Classes are entries into Class Membership tables in the system for classes that pertain to Eligibility

- Coverage and Enrollment includes the creation and updating of policies and segments

File Type	Record Type	Processing
Participation	Changes Only	1. Store Member Info 2. Store Eligibility Classes 3. Enroll in Coverage 4. Update Coverage
Participation	Full	1. Calculate Changes 2. Store Member Info 3. Store Eligibility Classes 4. Enroll in Coverage 5. Update Coverage
Eligibility	Changes Only	1. Calculate Eligibility

		2. Validate Eligibility Changes 3. Store Member Info 4. Store Eligibility Classes
Eligibility	Full	1. Calculate Changes 2. Calculate Eligibility 3. Validate Eligibility Changes 4. Store Member Info 5. Store Eligibility Classes

Population	Changes Only	1. Calculate Eligibility
		
		2. IF Eligible:
		
		    a. Validate Eligibility Changes
		
		    b. Store Member Info
		
		    c. Store Eligibility Classes

Population	Full	1. Calculate Changes
		
		2. Calculate Eligibility
		
		3. IF Eligible:
		
		    a. Validate Eligibility Changes
		
		    b. Store Member Info
		
		    c. Store Eligibility Classes

ASSUMPTIONS AND CONSTRAINTS

1. OIPA will only receive consolidated family neutral records. The insurance carrier's file receiving system will be responsible for combining multiple data subset files together when applicable to create consolidated family neutral records before passing to the OIPA system.

2. TPA/Multi-Customer files will be separated into Group Customer based files by the insurance carrier's file receiving system before passing to OIPA. Each Data Intake "File" that is sent to OIPA will consist of family neutral records which pertain to a single Group Customer.

3. Integration will send a request to process a file, regardless of how the file is loaded into the OIPA system. OIPA will not provide a background service that monitors the database or other mechanism that checks for the arrival of new files/records to process.

4. When the insurance carrier's file receiving system loads a file and sends a request to process to OIPA, the file is ready to be processed in the system. The File will have already gone through appropriate generic and global level validations to certify that the file is suitable for pre-processing by OIPA.

5. The insurance carrier's file receiving system will identify individual neutral family records with errors when passed as part of a Group Customer Data Intake file which passed the applicable generic and global level validations in the aggregate.

6. Integration between the insurance carrier's file receiving system and OIPA will be accomplished through a messaging interface. Since OIPA does not provide a native message interface, an OIPA bridge will be created by the consulting team that will receive messages from the insurance carrier's file receiving system and translate those messages onto the appropriate API calls in OIPA.

EXCLUSIONS

1. OIPA will not receive records for files that failed completely in the aggregate in the insurance carrier's file receiving system.
2. Determination of plan eligible class membership in conjunction with Data Intake file processing is limited to associate/employee/sponsor ("primary member") directly affiliated to Group Customer; dependent eligibility for enrollment under available benefit plans/coverages will be handled within OIPA at the Policy level based on applicable Plan/Coverage rules.
3. This document only covers data received from automated data intake. It does not cover other methods of receiving data – these will be entered using the Enrollment screen.

DATA INTAKE SOLUTION

SOLUTION OVERVIEW
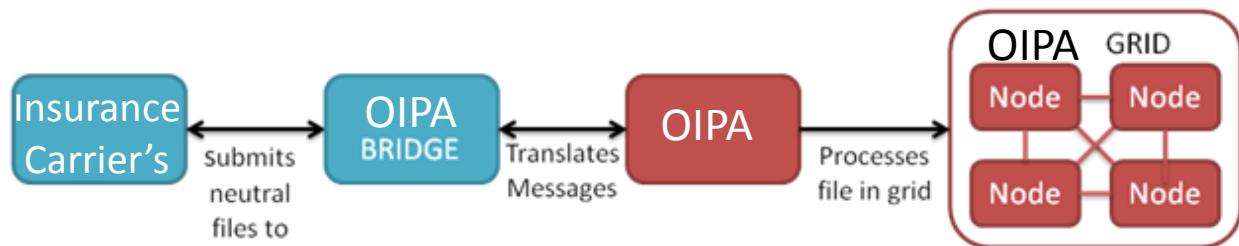
COMPONENTS

File Receiving System

The insurance carrier's file receiving system will be responsible for handling incoming files that are submitted by Group Customers and perform the following functions:

1. Transforms the files from the Group Customer specific format into a neutral format

2. Performs some validations on the incoming files and the file content. For example, ensures that identifiers are provided for member records.

3. If a file has many validation, formatting, or content errors, it is possible that the file cannot be processed at all. In this case, a file message is sent to OIPA for recording, but no record data is ever sent to OIPA.

4. Submits a File to OIPA for processing. In submitting a file, the file receiving system submits every Family Neutral Record with the file, along with additional data fields including the File Id and Group Customer Id.

5. Submits a request to OIPA to process a file, providing the unique file identifier.

6. For Multi-Customer files, the insurance carrier's file receiving system will segregate the file by Group Customer, and submit each Group Customer file to OIPA as a separate file.

7. An OIPA Bridge will need to be designed at the time of implementation for the purpose of messaging between the insurance carrier's file receiving system and the OIPA system. This OIPA Bridge is outside the scope of this document.

Messaging to JMS Server

File receiving system will be built to read files that are submitted by Group Customers and transform data to messages and send them to JMS server. OIPA Bridge(pas.di.ext) has listeners to listen incoming messages and create records then submit resumable task to complete file processing.

The following steps describe how to build messages with required properties.

1. **Create text message to beginLoading with the following string properties.**

Property	Value
operation	beginLoading
fileId	File id is unique identifier
customerNumber	Customer Number should be specified in File
profileName	Profile Name should be specified in File
expectedRecordCount	Expected record count need to be calculated based on number of record in the file

2. **Create text message to addRecord with the following string properties.**

Property	Value
operation	addRecord
fileId	File id is unique identifier
customerNumber	Customer Number should be specified in File
memberId	Member Id is the identification for the enrolling member
recordGroupId	Record Group Id should be specified in File to keep all member related records in one group.
processOrder	Value should be created for each record to process in the order

3. **Create text message to completeLoading with the following string properties.**

Property	Value
operation	completeLoading
fileId	File id is unique identifier
customerNumber	Customer Number should be specified in File

4. **Create text message to process with the following string properties.**

Property	Value
operation	process
fileId	File id is unique identifier
customerNumber	Customer Number should be specified in File

OIPA

OIPA is the Oracle Insurance Policy Administration system responsible for managing a carrier's insurance business. It is responsible for receiving a file and corresponding family records, and executing the file as a set of changes to entities in the system. OIPA performs the following Data Intake functions:

1. Pre-processes a file to determine if it can successfully be executed. This includes validating fields, calculating changes, and examining the file and its changes against acceptable thresholds.

2. If pre-processing is successful, OIPA will calculate the changes to the system for each of the family records for the file. Changes can include a net add, a net removal, or a net change to the sponsor / primary participant, the sponsor's employment information, sponsor's dependents, or coverage.

3. After processing a file, provides the ability to rollback a file, undoing all of the changes for all of the family records that were processed for that file. OIPA will only allow one file at a time to be backed out for a Group Customer.

** Note: The Data Intake capability in OIPA is built into OIPA Cycle. Each node that is receiving requests and processing files will be an instance of a cycle agent with Data Intake enabled.

OIPA Grid

The OIPA Grid is a set of interconnected computing nodes that work together in order to process long and/or process intensive tasks in parallel. The Data-Intake solution uses the OIPA Grid for processing. The OIPA Grid supports the parallel, high volume execution of work across a grid of interconnected computing nodes. Each work item that is submitted to the OIPA Grid is called a Task. There are two kinds of tasks that are executed in the OIPA Grid:

- A Resumable Task has the ability to execute for a long period of time, go through a sleep / wake process, report progress and return a result. There are typically very few Resumable Tasks running at the same time in the Grid.

- A Runnable Task is a discrete unit of execution that executes in a short period of time, on a single thread in a single node in the compute grid. It cannot be suspended, report progress, or return a result. Runnable Tasks are isolated and can be executed in parallel. Runnable Tasks make up the volume of work that is executed in the Grid. While there may only be a handful of Resumable Tasks executing at one time in the Grid, there may be thousands or millions of Runnable Tasks executing at the same time.

Data-Intake will use the same proven pattern already implemented by Cycle and Scheduled Valuation. The pattern follows:

- Use the database to hold the queue of work that needs to be processed in the grid. Each record in the work queue corresponds to a single unit of work that can be discretely executed in the Grid.

- Use a Runnable Task to process each discrete work item in the work queue in the database. When each Runnable Task completes, it updates its record in the database with a completed status.

- Use a Resumable Task to govern the execution of the entire process. The Resumable Task will use the work queue in the database, and submit each work item in the work queue to the Grid for execution as a Runnable Task. The Resumable Task goes through a sleep / wake process, replenishing the Grid work Runnable Tasks until all of the work in the database is complete.

The following diagram illustrates how the Resumable Task works.

```
        ●
         │ Sent to the Grid for processing
       ┌───────┐
       │Pending│
       └───────┘
         │ Executed for first time in Grid
       ┌───────┐
       │Submitt│
       └───────┘
Replenish Grid with work items  │ Prepare work queue in database
       ┌───────┐                      Re-executed by Grid
       │Running│◄──────┐
       └───────┘   Sleep ┌────────┐
         │               │ Suspen │
  No more work           └────────┘
       ┌───────┐
       │Comple │
       └───────┘
```
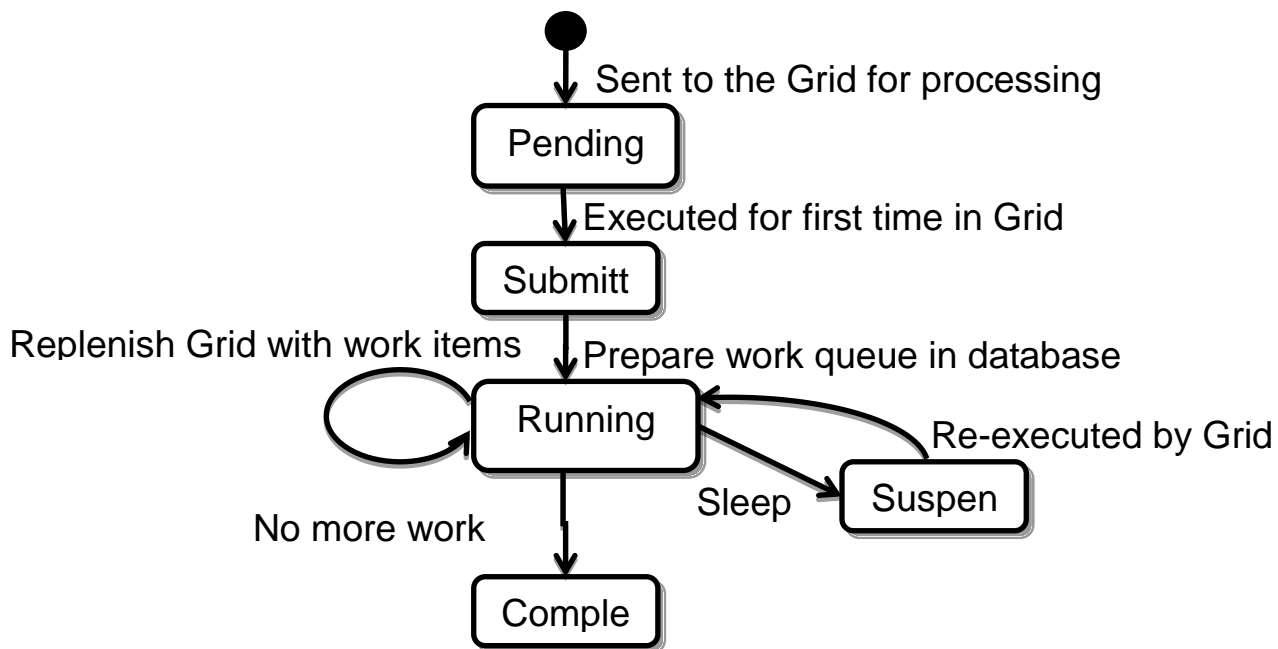
DATA INTAKE SETUP

As part of the Data Intake solution, several pieces of configuration will need to be implemented to support processing. This section describes the configuration, and where they will live in OIPA.

Intake Profile Definition

The Intake Profile Definition defines the file setup for an incoming file, and is configured in the Rules Palette Admin Explorer. The Intake Profile Definition includes the following:

1. The primary company the data intake definition is attached to

2. A name for the Intake Profile Definition

3. The fields of a record on the incoming file

    a. Fields include a name and data type.

    b. Field definitions can include configured constraints that are used for purposes of validation. For example, using constraint configuration a field can be made to be required. Additional constraints can be used for defining valid values, data ranges, data length, and patterns.

    c. Field attributes can define meta-data that will be attached to a field.

4. An Intake Profile Definition Rule which defines the fields, actions, events, and screen math that are used when a Data Intake Profile is setup for a Group Customer.

5. The File Definition Configuration that contains the following configuration:

    a. Dynamic fields that can be captured for the file.

    b. Configuration for how to pre-process the file.

    c. Name of the Data Intake File Transaction

6. The Record Definition Configuration that contains the following configuration:

    a. Dynamic fields that can be captured for the record.

    b. Configuration for how to calculate changes and process the record.

    c. Name of the Data Intake Record Transaction

7. An XSLT style sheet that can transform the incoming record onto the OIPA internal domain model format. If no XSLT style sheet is defined, the record will be assumed to already be in our OIPA internal domain model format.

Intake Profile

An Intake Profile is created for a Group Customer based on a previously defined Intake Profile Definition. In the OIPA application, a user can setup a new Intake Profile by choosing an Intake Profile Definition. The user will then enter the fields that are defined in the Data Intake Definition Rule. The user will also be able to override the data constraints that are defined in the Record Fields in the Intake Profile Definition.

1. A user creates an Intake Profile based on an Intake Profile Definition.
2. The dynamic fields in the Intake Profile Definition are shown and can be set.
3. When the Intake Profile is first saved, it is in a "Setup" status.
    a. An Intake Profile can move to different statuses through an Activity.
    b. A new business rule will be provided to move the status of an Intake Profile.
4. A user can delete an existing Intake Profile. The Intake profile is only available for deletion if it is in a "Setup" status.
5. The user can setup the Record Details for the Intake Profile.
    a. The user is provided with a list of all of the record fields that are defined in the intake profile definition.
    b. The user will be able to define the constraints for fields that are coming in on a record in the file.
    c. Constraints include required, valid values, length, range, and pattern.
         i. If a field has a valid values constraint, the user can modify the list of valid values.
        ii. If a field has a range or length constraint, the user can set the min and max value for the field.
       iii. The user can indicate if a field is required or optional
        iv. If the field has a pattern constraint, the user can define a regular expression that the field value must match.
    d. If there are meta-data attributes defined for a field, the user can enter a value for the field attribute.

Intake File Screen

The Intake File Screen allows the user to access all of the processing information for a file. The Intake File Screen is available in the application under the Group Customer context. The File screen will provide the following capabilities:

1. Search for specific files using defined search fields from in the IntakeFileScreen rule.
2. View the files that have come in for a Group Customer
3. View details pertaining to a selected file.

4. Access the Intake Record Screen to view the records that were received for a given file.
5. Reverse an entire file.

Intake Record Screen

1. Search for specific records using defined search fields from in the IntakeRecordScreen rule.
2. View the files that have come in for a given file.
3. View details pertaining to a selected record.
4. See the results of pre-processing a record, including the changes that were calculated as well as any validation errors
5. See the results of executing a record, including the results of the activities that were run, and some information on any first level activities that were executed on part of a record.

Data Intake File Transaction

The Data Intake File Transaction is a standard OIPA transaction that is setup and configured in the Rules Palette and can be overridden down to the Group Customer Level. The Data Intake File Transaction is processed for a a single file that is received in order to calculate and capture statistics relevant to the received file and perform necessary updates to the system as a result of that file. Additionally, validations can be run at the file level by attaching the ValidateExpressions business rule to the Data Intake File Transaction in order to verify that certain criteria pertaining to the file has been met.

Data Intake Record Transaction

The Data Intake Record Transaction is a standard OIPA transaction that is setup and configured in the Rules Palette and can be overridden down to the Group Customer Level. The Data Intake Record Transaction processes the changes for a single family record, generating one or more activities to be run in the system. The kinds of processing that are performed by the activities created in the Data Intake Record Transaction include:

- For a new member, create the member in the system and if auto-enrollment is enabled, create an Enrollment activity for the new member

- For a removed member, if auto-cancel is enabled, create a Cancel Coverage activity for the member to terminate coverage

- For a member who has an address change and a new dependent, create the following activities:

   o Add Dependent activity for the member to create the dependent client in the system

   o Update Address activity to modify the address for the member

   o Change Coverage activity for the member to modify the member's coverage information, for example changing coverage tiers.

The Data Intake Record Transaction itself will provide:

1. A Math section to evaluate the record and calculate Activities and other math variables
2. Support for the Validate Expressions attached business rule that can cause the record to fail with an error status
3. Support for the CopyTos business rule to update supplementary record field values

4. An Activity Sequence Process section that will detail the order of sequence of entities and activities to run in the system.

Supplemental Transactions

The Intake Record Transaction is designed simply to tie the data intake with transactions that are already available in the system. As such, the transactions that impart material changes in the system, such as Enroll, Terminate Coverage, Add Member, etc. need to still be configured in order to realize changes in the system.

POPULATION GROUPS

Certain files that are sent by a Group Customer pertain to a certain population group (e.g. Executive, Active, or Retired). The Group Customer will send in different files for each population group. In OIPA, an Intake Profile is setup for each population group that is provided by the customer.

An insurance carrier can utilize population attributes that are used to determine if a member belongs to a particular population group. For example, a member maybe part of the Retired population group if the JobStatus field is set to 'R'.

Population groups are an essential component to auto-cancellation. Simply the absence of a record on a file for a particular Intake Profile does not automatically result in the member being auto-cancelled. We must inspect the member's information in the OIPA system to determine if they belong to the population group identified by the Intake Profile.

The recommendation is to use a new Class Group type to define a "Data Intake Population Group". Class Groups already support segmentation of a population of people into different classes. This feature of OIPA is already used for Eligibility, Reporting, and Billing. Extending Class Groups to account for "Intake Population Groups" makes sense because it already supports the following features:

1. Segment people into classes

2. Specify configurable membership rules that are run against system data to determine membership in a particular class

3. Can be invoked in transaction math to determine current class (i.e. population group) for a given member.

4. Class Groups can be copied, becoming easier to setup and maintain in the application.

When an Intake Profile is setup, a drop down list can be provided with a list of all Data Intake Population Groups that are defined in the Data Intake Population Group Class Group for that Group Customer. During file processing, the member's population group can easily be obtained by either querying the class membership table for the Data Intake Population Class Group, or by calculating the membership in the transaction. The resulting class can be compared against the chosen population group that was set on the intake profile.

DATA INTAKE PROCESS FLOW

Insurance Carrier   OIPA BRIDGE   OIPA

Group Customer sends file to Insurance Carrier

```
                          Translate  →  Store File        *For Each Record
   Transform                                                 in Each FNR

                          Translate
                          Message,
   Is File Valid?         make API      Pre-     ┈┈┈┈┈>   Validate
                          Call to
              YES                                           Calculate

   Send File                          Run File
                                                            Create
                                    *For Each Record
                                       in Each FNR
   Send                                Execute              Run
```

File Processing Complete
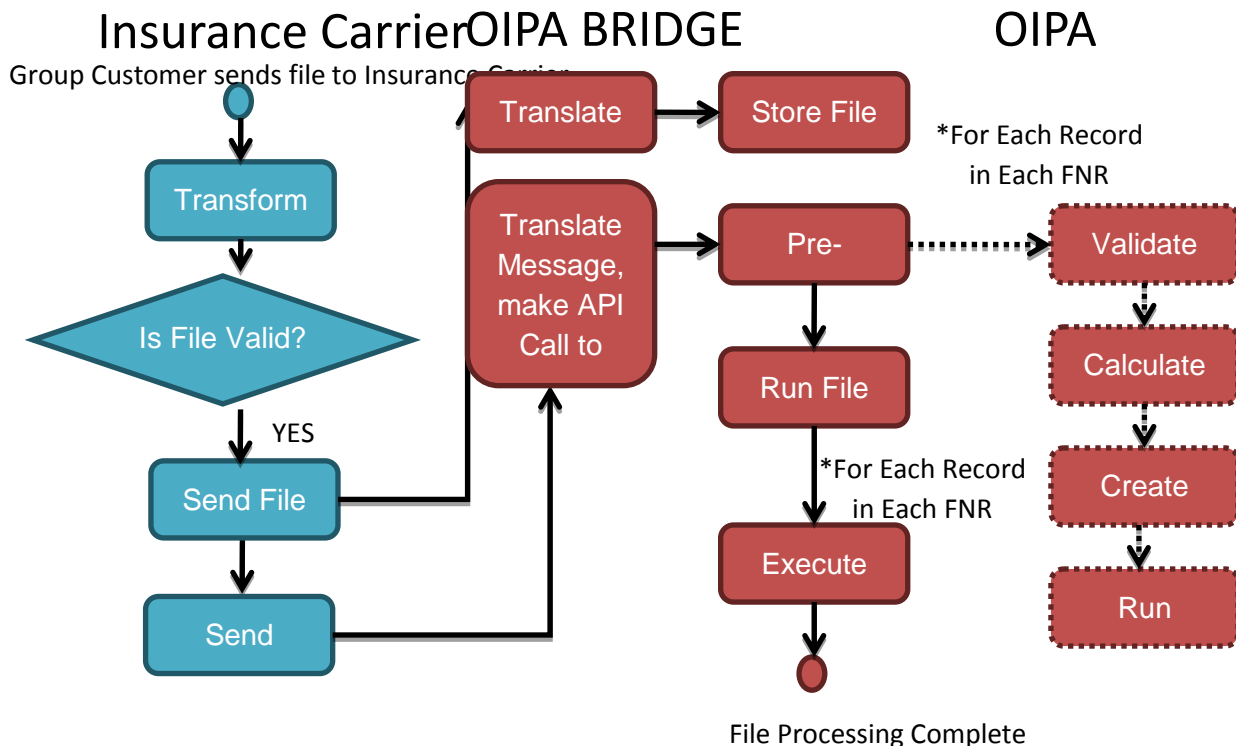
This section describes an end-to-end processing flow of files coming through the insurance carrier's file receiving system to OIPA. This section may not contain all of the requirements for intake file processing. More detail is provided in subsequent sections in this document.

1. The process begins when a Group Customer submits a File to the insurance carrier for processing. The files are received in various formats, including text, EDI and Excel. The insurance carrier receives the File and initially processes it in the file receiving system. The file receiving system governs the end-to-end receiving of files for the insurance carrier. The file receiving system performs several processing steps on the file and associated records before submitting them to OIPA. Examples of the file receiving system processing include:

    a. Checking the entire file at a high level to ensure that it can be processed

    b. Breaking down the file into records

    c. Mapping the records into a neutral format

    d. Managing Duplicate Records

    e. Applying Ignore Rules

    f. Compiling a single Family Neutral Record from disparate member and dependent records

    g. Running initial record and file high level validations

2. If a file is deemed valid, the insurance carrier's file receiving system will send the file and all family neutral records to OIPA for processing. The insurance carrier's file receiving system communicates to OIPA through the OIPA Bridge, which is a component implemented by implementation that translates messages from the file receiving system into the appropriate API calls in OIPA. The insurance carrier's file receiving system will submit the file header, including a unique file identifier, group customer number, expected record count, and the intake profile name. The intake profile name is used to look up the file processing configuration for the file. As the number of records can be rather large, the file will remain in a "Loading" status in OIPA until all of the records have been received.

    a. If the file is a TPA / Multi-Customer File, the insurance carrier's file receiving system will segregate each group customer into separate files for submission to OIPA.

    b. The insurance carrier's file receiving system will also send additional file details to OIPA for purposes of reporting and processing. For example, the system will send the number of records that failed with fatal errors to OIPA. That information will be made available on the Intake File screen in OIPA, and will also be available to configuration for purposes of threshold processing.

3. The insurance carrier's file receiving system will then load all of the Family Neutral records that it compiled into OIPA. Each record will contain identifying information, including the sponsor id, the unique identifier of the file the record belongs to, and the family neutral XML data. Each record corresponds to a member of the Group Customer. It contains the sponsor / employee information, as well as dependent information. It is expected that the file receiving system will submit all family neutral records, including those that have errors, in order to allow OIPA to properly run validations.

    a. Each Family Neutral Record is comprised of a series of records containing information pertaining to a member belonging to a particular Sponsor. Each Record in a Family Neutral Record will be processed in the order that it is provided to OIPA. The order of processing is determined in the file receiving system.

4. Once all of the records have been loaded, the insurance carrier's file receiving system will indicate to OIPA that the file is finished loading. OIPA will update the status of the file to "Pending".

5. The insurance carrier's file receiving system will submit a Process File request to OIPA, sending in the unique file identifier, to indicate that processing can begin for the file.

    a. It is possible that the Process file request is not explicitly sent by file receiving system, but rather generated in the OIPA Bridge. The exact signal that results in a process file request being made is an implementation consideration outside the scope of this document.

6. OIPA will look up the Data Intake Profile for the file to determine the preferences and other fields, as well as the configuration that will be used to process the file. Using the configuration, OIPA will prepare the file for processing.

    a. If File Comparison is configured in the Data Intake Profile for the file, OIPA will run file level comparisons by comparing the incoming file to the last successfully processed file that was received for the same Data Intake Profile. If any records are missing in the new file, empty records will be created and associated with the new file, the records will be marked as "Removed from File".

    b. OIPA will update the file to a "Pre Processing" status, as well as update all records to a "Pending Pre-Processing" status, which queues the file and records for processing in OIPA.
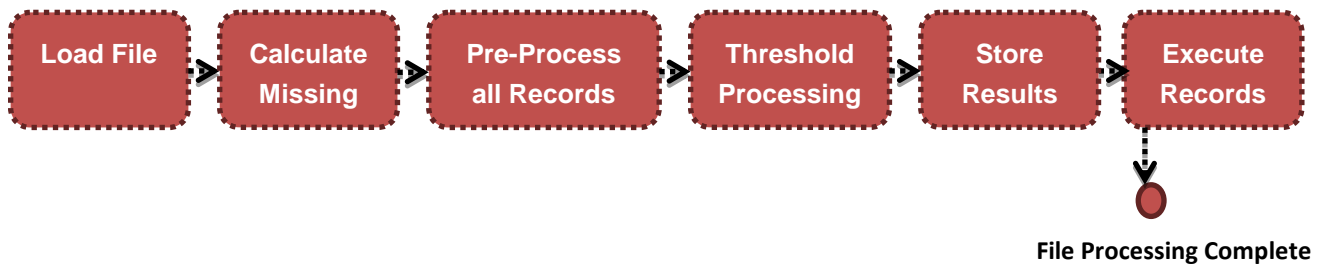
7. All records within a family neutral record are processed together, in the order that was specified when the records were created in OIPA. The record with the lowest process order is processed first. Each record in the FNR runs through the pre-processing configuration attached to the Data Intake Profile. The following steps describe a scenario for pre-processing of each record in the FNR:

   a. Validate the Fields in the record.

      i. If any fields fail validation, the field will be marked as having a validation error.

   b. Calculate changes for the record.

      i. If file comparison is enabled, look up the last family neutral record processed for this member and intake profile. Compare the current record to the last record and calculate the changes.

      ii. If system comparison is enabled, load the field data from the OIPA database. Compare the current record to the system data and calculate the changes.

         1. If there is more than one record pertaining to the same member in an FNR, only the first record will be compared to system state. Subsequent records for the same member in the same FNR and file will be compared to the prior record in the FNR.

   c. Execute math to perform calculations and generate the map of activities (the Activity Sequence Process) that need to be run in the system.

   d. Execute business rules for the record.

      i. For example, Cross field validations can be exercised in math, and fail in the Validate Expressions.

   e. Blocking Rules will be consulted to determine if other records in the FNR can continue processing when an error is incurred.

   f. Store the Activity Sequence Process in the system, as well as any additional data that was set while running the pre-processing configuration.

      i. For example, the Record may be marked as an "Auto Cancel". That information would be persisted to the system.

   g. Move the record to a "Pending Validation" status if it is not a fatal error.

8. After all of the records have been pre-processed, the File Level Processing will be run to determine if the file can be executed. At the File Level, the following processing occurs:

   a. Calculate statistics in Math for the file using the File level transaction.

   b. Run validations to determine if any thresholds failed.

   c. Update File Level information to store the statistics and other data for reporting purposes.

   d. Depending on the outcome of file level validation, the file processing could be halted and an error message sent to the insurance carrier. In this event, the File will be marked as error, and

the activities that were generated in pre-processing will not be executed, the file will not continue processing.

9. Once the File passes validation, OIPA will prepare the file for Execution. All of the records marked as "Changed", "New to File", or "Removed from File" will be updated to a "Pending Execution" status, and the status of the file will be marked as "Executing". This will schedule the file for execution in the OIPA Grid.

10. All records within a family neutral record are processed together, in the order that was specified when the records were created in OIPA. The record with the lowest process order is processed first. All of the activities for each record will be processed before moving onto the next record in the FNR.

    a. If any record within an FNR fails for any reason during activity processing, blocking rules will be consulted to determine if records can continue processing in the FNR.

        i. If an error has occurred on the primary member / sponsor, then processing will halt for all of the subsequent records for this FNR. Those records will be updated to have a "Blocked" status.

        ii. If an error has occurred on a dependent record, then processing will halt for subsequent records in the FNR pertaining only to that dependent that failed. Those records will be updated to have a "Blocked" status.

    b. After activities are executed for each record in the FNR, the record is updated to an "Active" status.

11. Once all of the Records in a file have been executed, the File will complete processing in OIPA. The File record in the database will be updated with the status and any other information relevant to the processing of the file. Once the file is complete, it will be saved in a "Complete" status.

FILE PROCESSING DETAILS

A File is particular to a single Group Customer. The particular way that a file is processed in the system is defined through the Intake Profile Definition, which is configured in the Rules Palette. The user has the opportunity to tailor the intake profile definition when an Intake Profile is created in the application. When creating an Intake Profile, the user can set thresholds, record field constraints, and other data that are used by OIPA during file processing.

Load File	Calculate Missing	Pre-Process all Records	Threshold Processing	Store Results	Execute Records

File Processing Complete

LOAD FILE

A File is loaded into OIPA from the insurance carrier's file receiving system. In an implementation an OIPA Bridge will be created as part of the process that will translate messages coming in from the insurance carrier's file receiving system into appropriate API calls. For example, a "Start File" message might translate into a "Begin Loading" API call in OIPA. The file level information, and record level information, are sent to OIPA from the insurance carrier's file receiving system while the file is loading. To complete loading, file receiving system will send an indicator that the file is done, the file will go into a Pending status in OIPA.

The file is triggered to process by an explicit signal that is sent by the insurance carrier's file receiving system, or through an API call made by the OIPA Bridge. The details of the exact mechanism to trigger processing are outside of the scope of this document.

 The following features pertain to loading a file into OIPA.

1. OIPA will provide a suitable extension mechanism to allow code to be written to receive messages from a message queue and call API methods. This extension mechanism will be used by the OIPA Bridge referred to in this document.

2. Files that fail in the insurance carrier's file receiving system will be recorded OIPA. OIPA will simply store the file header, error information, and any other relevant information in OIPA.

    a. OIPA will not allow a file that failed in the insurance carrier's file receiving system to be processed or reversed.

    b. OIPA will not capture any records for a file that failed in the insurance carrier's file receiving system.

    c. The failed file and related details that were captured in OIPA will be visible in the Intake File screen.

3. OIPA will support dynamic fields configured at the File level defined in the Intake Profile Definition. This will allow any field to be set when the file is sent to OIPA.

    a. These fields can be used to capture the insurance carrier's file receiving system's statistics, like existing records with fatal errors.

    b. These fields will be visible in the Intake File screen.

4. Warnings for records that are generated in the insurance carrier's file receiving system will be able to be captured in OIPA.

    a. These warnings will be visible in the OIPA application.

    b. These warnings will be available for reporting, as well as for processing the record.

5. While a file is loading, the file cannot be reversed.

6. Each Family Neutral Record sent to OIPA consists of one or more member records pertaining to either the sponsor for the FNR, or a dependent of the sponsor.

    a. Each record in an FNR has a prescribed order for which they should be processed.

CALCULATE MISSING RECORDS

The second step in processing a file is to calculate missing records. This step is only executed if it is configured in the Intake Profile Definition that the file is using for processing.

Missing records are calculated by examining records at the Sponsor (FNR) level. OIPA will look up all of the FNRs that have ever been received (but have not been removed) for a particular Group Customer and Intake Profile. It will then inspect each member record in an FNR to determine which members are missing in the current file. The method of determining missing members is different for Full Population Files vs. Changes Only Files as noted below.

1. A member record that is missing for the current file will be created into the current file with a "Removed From File" status.

2. Only "Active", successfully processed member records will be considered for evaluation.

    a. If a member has records, but no record was ever successfully processed, the member is not considered as ever being processed.

    b. If a member has records, but all of them have been reversed, the member is not considered as ever being processed.

3. If more than one member is missing from an FNR, a single record will be created for each missing member. The process order is determined by looking at the process order for the last record for the missing member.

    a. Only one member record will be created as "Removed from File" for each missing member. For example, if the previous FNR had 2 records for the same dependent member, only the one missing record will be created.

4. For a Changes Only File, no members will be calculated as missing if the entire sponsor (FNR) is missing from the current file.

5. For a Full Population File, if an entire Sponsor (FNR) is missing, then an entire FNR will be created for the current file. A member record will be created for each member that was present in the last FNR.

    a. Only one record for each missing member will be created in this case. If the previous FNR had 2 records for the same member, only one missing record will be created.

PREPROCESS ALL RECORDS

A file enters pre-processing when the "Process" API Call is made from the OIPA Bridge. At that time, the records are all staged in the database, ready to be picked up for processing in the OIPA Grid. Pre-Processing for records is defined through the Intake Profile Definition, Intake Profile, and Data Intake Transaction. The phases of processing individual records are described in detail subsequent this section. This section will only provide a summary review of record level processing.

1. Records are processed in record groups according to the Family Neutral Record they belong to. Records are processed according to the order in which they were submitted to OIPA by the insurance carrier's file receiving system.

2. Each record has information pertaining to the employee / primary participant / sponsor, or one of the employee's participants.

3. The record is exercised against the field validations defined in the Intake Profile and Intake Profile Definition. Errors and warnings are generated at this time, and made available for processing.

4. Changes are calculated for the record. Changes can be calculated against the prior record for the member or the system data for the member. How changes are calculated will be defined in the rules configured in the Rules Palette.

5. Math configured in the Intake Record Transaction is run for the record, and is provided the calculated changes, field warnings and errors, record data, and intake profile fields. Here, activities will typically be generated to create an activity sequence process that is appropriate to impart the changes for the record in the system.

6. Attached Business Rules are executed for the record.

    a. An example of an attached business rule is Validate Expressions, where expressions are evaluated to test different conditions in the record and information calculated in Math. The outcome of Validate Expressions could result in failing the record.

7. The results of the record are stored in the database, including the activities that were calculated. The activities are not processed at this time; they are executed after threshold processing.

INTAKE FILE TRANSACTION THRESHOLD PROCESSING

A file enters threshold processing after all of the records for the file have completed pre-processing. At this time, activities have been created, but not executed, for all of the records. Record information, statuses, changes, warnings, and other information are stored in OIPA and available for reporting and in the user interface. The following requirements apply to Threshold Processing:

1. Threshold processing executes the file transaction in order to calculate statistics. This can include queries to generate counts and other metrics.

    a. For example, the number of auto-cancels can be calculated by running a SQL query in the math section of the transaction to find all records that have been marked as auto-cancel.

2. The statistics that are generated in the Math section of the transaction will be captured and stored in the system. Statistics will be able to be copied to file level fields using the CopyTos attached business rule.

3. A Validate Expressions business rule can be attached to the file transaction to test various variables that are calculated in the Math section in order to determine if a file is valid able to be processed.

a. For example, the number of auto-cancels can be tested against an Auto-Cancel threshold that is configured in the Intake Profile. If the number of auto-cancels exceeds the threshold, the error will be stored and the records will not be processed further.

4. If a file passes the Validate Expressions, then the activities that are generated for the records in the file are executed. The status of the file moves to Executing.

5. If a file fails the Validate Expressions, no activities will be run in the system for the file. The status of the file moves to a Business Error status.

    a. The file is not available for reversal processing.

    b. The file and all records should not be considered for future processing. For example, they should not be used for purposes of changes calculation or calculating missing records.

EXECUTE RECORDS

After a file passes threshold processing and is considered valid for execution, all of the activities for all of the records that were generated as part of pre-processing are run. Details on how each record's activities are executed are detailed in the Phases of Data Intake Record Processing section below. When a file finishes execution for all activities, the status of the file moves into a "Complete" status.

DATA INTAKE RECORD PROCESSING DETAILS

A record is part of a larger organizational unit called the Family Neutral Record (FNR). Each record contains information pertaining to a member, either the employee or one of the dependents of the employee. A record has a process order, indicating the order of processing for the record in the FNR. This section describes the steps involved in processing a single record in OIPA. Each step in the processing is described in detail with requirements.

Record Processing Complete

VALIDATE FIELDS

Field Validation evaluates the fields on the record against the validation configuration that is defined in the Rules configured in the Intake Profile Definition. The following requirements apply to field validation:

1. Constraints can be defined for each field that is expected to come in on a record.

    a. Example constraints are required, valid value, length, range, and pattern.

2. The kinds of constraints need to be configurable in the Rules Palette for the Intake Profile Definition.

    a. This is the definition of default constraints. Perhaps some fields are, by default, required. Other fields should, by default, be a certain value.

3. Constraints can be overridden or added in the application when Intake Profiles are created.

    a. For example, the user may change the list of valid values for a field constraint, or mark a particular field as required.

4. Each constraint can result in an error or warning when evaluated.

   a. Part of the configuration for each constraint will be to specify if an error or warning should be returned upon failure of the constraint. If an error is returned processing will be halted, if a warning is specified processing will not be impeded.

5. All validation errors and warnings are stored in the system, and available for reporting.

6. All validation errors and warnings are available for processing.

   a. For example, all warnings that are generated during field validation are available to the intake transaction for evaluation. This would allow the configuration in the intake transaction to choose to ignore warnings or stop processing.

CALCULATE CHANGES

Changes Calculation evaluates the data coming in on a record against either the prior record for the member or the current system data for the member. The purpose of changes calculation is to determine what information has changed. These changes are then made available to downstream processing to determine what to do with the changes.

1. Changes Calculation will only be performed if it is configured to run. For use cases outside of Group member processing, it may never be appropriate to calculate changes.

2. OIPA can support comparing record information to a prior record for the member.

   a. If comparing the first record for the member for the current file, OIPA will compare the current record against the last Active record for the member.

   b. In the event that this is the first time this member is coming into OIPA, the record will be marked as "New To File", and the changes calculated will simply be that the member is new.

   c. Only the last "Active" successfully processed record for a member will be used for calculation. Reversed or Failed records will not be used for changes calculation.

3. OIPA can support comparing record information to the current system state for the member.

   a. OIPA will only compare against system state for the first occurrence of a member within an FNR. If the same member occurs multiple times within the same file and FNR, subsequent records to the first record will be compared against the previous record within the same FNR.

4. Changes that are calculated under either method are saved in the system.

5. Changes that are calculated are available for processing downstream in the record process.

6. Changes that are calculated for a record will be visible in the user interface and available for reporting.

PROCESS INTAKE RECORD TRANSACTION

The Intake Record Transaction provides a robust configuration mechanism to exercise a record. Here, it is up to the implementer to determine how to process the record. The following features are available in the Intake Record Transaction.

1. Math is processed in order to calculate variables that are used downstream in the transaction.

   a. All record information, including field errors and changes are provided to Math for purposes of evaluation and determining what to do with the record.

   b. Math will have the ability to create Activities at any level in the system (on a Client, Policy, Group Customer, Plan, Company, or Client Relationship).

2. Business rules are executed against the record to determine if it is valid. Complex expressions can be used to cross check field values and evaluate any of the variables that were calculated in Math.

   a. If a record fails validation, the record is saved in an error status.

   b. The error information that is generated will be saved with the record and available for reporting and in the OIPA user interface.

3. Supplementary record fields can be set.

   a. For example, if a record is to be marked as an "Auto-Cancel", an Auto-Cancel supplementary record field can be set to True.

4. An Activity Sequence Process can be created to impart the changes for a record into the system.

   a. The Activity Sequence Process contains an ordered sequence of entities and activities that need to be executed in the system.

   b. If the record fails validation, the activity sequence process will not be created.

   c. The Activity Sequence Process creates the activities, but does not process them. The activities are processed after the threshold processing completes for the file.

5. When the Data Intake Transaction completes, all information is stored in the system in a single transaction, including all warnings and changes.

   a. This includes the activities that were created, and any updates to the record itself.

   b. If the record is not in error, the record enters into a "Pending Validation" status waiting for threshold processing to complete.

WAIT FOR THRESHOLD PROCESSING

Threshold Processing is part of the File Processing defined above. Here, the record remains in a Pending Validation status until all records complete processing, and the File Level Validation can execute.

1. If file validation fails, all records should be moved into a "File Validation Failed" status.

2. If file validation passes, all valid records are presumed to move into execution where all activities for all records will be processed.

   a. Valid records are those that are in a "Pending Validation" status. Any records that failed pre-processing in an error status will not be processed.

EXECUTE ACTIVITIES

After file validation succeeds, all records that are in a "Pending Validation" status are moved into a "Pending Execution" status, where they are scheduled for execution in the grid.

1. Records are processed in record groups according to the Family Neutral Record they belong to. Records are processed according to the order in which they were submitted to OIPA by the insurance carrier's file receiving system.

2. Only records in "Pending Validation" status will be processed. Any records that failed in an error status during pre-processing will not be executed.

3. If any activity fails in a business or system error, all subsequent activities for that record are not processed. The record is marked with an error status, and the error information is saved on the record.

4. If the record fails in an error status, blocking rules are consulted to determine if downstream records (records subsequent to the current record based on process order) should be blocked.

   a. If any records should be blocked, those records will be updated to have a "Blocked" status.

5. Once a record completes processing all activities, it will be saved in an "Active" status.

RECORD BLOCKING RULES

A FNR is processed together as a unit of work. It is comprised of a series of records that need to be processed in order. During processing, a record may fail with an error status, in which case OIPA must provide a mechanism to block processing of records subsequent to the current record in the same FNR.

The Record Blocking Rules are as follows:

- If any record pertaining to the primary member / sponsor / employee representing the FNR fails, all records subsequent to the record must not be processed.

  o For example, if the sponsor member is the second record out of ten records, and it fails processing, then all subsequent records (3-10) for the FNR will block processing, irrespective of the member type.

- If any record pertaining to a dependent of the sponsor fails, only subsequent records pertaining to the failing dependent will fail.

  o For example, if a record for the wife fails processing, only subsequent records for the wife will block processing. Records for the children, even if they are subsequent to the wife, will not block because they pertain to a different dependent than the wife.

FILE REVERSAL PROCESSING

OIPA will support the reversal of a file that was already processed in the system.

1. Only the last file that was processed for a particular Group Customer / Intake Profile combination will be available for reversal.

   a. If a file has any Intake Activities that are processed successfully, it will be eligible for reversal.

2. Reversal Processing follows the same path as forward processing, where records are processed in record groups related to the Sponsor (FNR).

   a. Reversal Processing processes records in reverse process order. The last record in an FNR that was processed during forward processing will be the first record processed in the FNR during reversal.

3. If a record in an FNR fails with a system error (unexpected exception), the error will be recorded in the system for the failed record.

   a. All records subsequent to that record will be blocked.

4. If any record fails during reversal processing, the File is put into a "Reversal Error" status.

   a. This allows time for someone to take corrective action.

5. A file in a reversal error status remains the only eligible file for reversal for a Group Customer / Intake Profile combination.

   a. A file in a Reversal Error status can be retried for reversal.

   b. Any records that are in a Reversal Error status will attempt to be reversed again.

c. If a record in Reversal Error status fails again, it remains in an error status. The error information is updated to reflect the current error. The file itself will remain in a Reversal Error status as long as any single record is in Reversal Error.

SET UP JMS SERVER FOR DATA INTAKE ON WEBLOGIC

CREATE A JMS SERVER

1. In the WebLogic Admin Console, navigate to **Services > Messaging > JMS Servers**.

2. Select **New**.

3. In the Name field, enter "DataIntakeJMSServer."

4. In the Persistent Store field, select **(none)**.

5. In the Target field, select **Cycle**.

6. Click **Finish**.

The JMS server should now be visible in the list with Health OK.

CREATE A JMS MODULE

1. In the WebLogic Admin Console, navigate to **Services > Messaging > JMS Modules**.

2. Select **New**.

3. In the Name field, enter "DataIntakeJMSModule." Leave all the other fields empty.

4. In the Target field, select **Cycle**.

5. Click **Next**.

6. Leave the "Would you like to add resources to this JMS system module" checkbox unchecked and click **Finish**.

CREATE A SUBDEPLOYMENT

A subdeployment is not necessary for the JMS queue to work, but it allows you to easily target subcomponents of the JMS module to a single target or group of targets. We will use the subdeployment in this to target the following connection factory and JMS queue to the JMS server we created earlier.

1. In the WebLogic Admin Console, navigate to **Services > Messaging > JMS Modules**.

2. Select **DataIntakeJMSModule**.

3. Select the **Subdeployments** tab.

4. Click **New**.

5. In the Subdeployment Name field, enter "DataIntakeSubdeployment."

6. Click **Next**.

7. On the Targets page, you can select the target(s) for the subdeployment. You can choose either Servers (i.e. WebLogic managed servers, such as the DataIntake) or JMS Servers (DataIntakeJMSServer) such as the JMS Server created earlier. As the purpose of the subdeployment

in this scenario is to target a specific JMS server, we will choose the JMS Server option. Select **DataIntakeJMSServer**.

8. Click **Finish**.

CREATE A CONNECTION FACTORY

1. In the WebLogic Admin Console, navigate to **Services > Messaging > JMS Modules**.

2. Select **DataIntakeJMSModule**.

3. Click **New**.

4. Select **Connection Factory**.

5. Click **Next**.

6. In the Name field, enter "IntakeConnectionFactory."

7. In the JNDI Name field, enter "IntakeConnectionFactory."

8. Leave the remaining fields as is.

9. In the Target field, select **Cycle**.

10. Click **Finish**.

CREATE A JMS QUEUE

1. In the WebLogic Admin Console, navigate to **Services > Messaging > JMS Modules**.

2. Select **DataIntakeJMSModule**.

3. Click **New**.

4. Select **Queue**.

5. Click **Next**.

6. In the Name field, enter "DIQueue."

7. In the JNDI Name field, enter "DIQueue."

8. In the Template field, select **None**.

9. Click **Next**.

10. In the Subdeployments field, select **DataIntakeSubdeployment**.

11. Click **Finish**.

The JMS queue is now complete and can be accessed using the JNDI names IntakeConnectionFactory and DIQueue.

CREATE A WORK MANAGER

1. In the WebLogic Admin Console, navigate to **Environments > Work Managers**.

2. Click **New**.

3. Select the **Work Manager** radio button.

4. Click **Next**.

5. Enter a name for the new Work Manager.

6. Click **Next**.

7. In the Available Targets list, select the cycle server for the target server.