Arius®
Getting Started

Milliman
IT TAKES VISION
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1. Installation

- Complete installation requirements and procedures are here:  
  http://www.actuarialsoftware.com/actuarialsoftware/support/arius/
- Note: Administrator privileges are required to install Arius.

OPEN ARIUS

After installation you will be prompted to open the application, or you can find it listed as Arius in your START|ALL PROGRAMS listing should you want to open it later.

Authenticate

When opening Arius the first time, you will be prompted to enter your email address to authenticate as a licensed (trial or production) user. You must be connected to the Internet to authenticate Arius.

After the Welcome screen, the File screen displays. From here you can confirm what version of Arius you have installed, and you can open an existing Arius project or create a new one.

SAMPLE FILES

Arius installs with three sample project files, a sample external factor file and several sample API files.

The project and factor files can be found in C:\...Documents\Milliman\Arius\DemoFiles.

- Arius_Sample.apj
  This is sample data with 5 segments (a mix of short, medium and longer tailed). It is intended to give you a sense of the system’s capabilities and a sampling of how the models can be set up with different assumptions for different lines. Note that all of the segments don’t necessarily work with all of the models (much like in the real world...).

- ODP_Mack_Hayne.apj
  This is sample data with 3 segments, showing a detailed implementation of all three families of stochastic models fully parameterized.

- Hayne_Paper.apj
  This file contains the data used in Dr. Roger Hayne’s paper on maximum likelihood estimator approaches, “A Flexible Framework for Stochastic Reserving Models” available from HELP | TECHNICAL REFERENCES.

- SampleIndustry_FactorLibrary.xlsx
  This is sample paid and incurred development factors for 10 lines of business, some of which are mapped and displayed in the corresponding exhibits in Arius_Sample.apj.

- The API files can be found in C:\...Documents\Milliman\Arius\API\ExcelVBA Samples.
  Note that all API examples are described in the Arius API User Guide, available from HELP | USER DOCUMENTATION.
2. Creating a new project

WHAT IS A PROJECT?

An Arius project contains a set of input arrays, diagnostic and development exhibits, actuarial methods and reports, and selections for one or more reserving segments.

WHAT IS A SEGMENT?

A segment in an Arius project contains a complete set of tables for performing an analysis, whether that is a line of business, a specific coverage, or any other grouping on which a reserve review is performed. A project can contain one or more segments. All segments in a project file will have the same structure, views, and available tables.

CREATE A NEW PROJECT

To create a new Arius project, click File | New and select one of the options.

- Create a new Arius project by manually defining the structure and segment(s).
- Create a new segment in the current Arius project from a segment in a different Arius file, importing data into the new segment.
- Create a new Arius project from a ReservePro file, reproducing the structure and user-defined tables of the original ReservePro file and importing all data, settings and selections from one of the layers of the ReservePro file.
- Create a new segment in the current Arius project from a ReservePro file, importing data and selections from one layer of the ReservePro file into the new segment.
3. Navigation

A project opens to the **Home** screen. The **Home** window displays the project file name at the top and the title, structure, and active segment directly below the **Home** ribbon. The **Home** screen includes the **Home** ribbon, general project information and views populated with data of the currently-active segment.

**THE HOME SCREEN**

![Navigation Pane]

**Segments**

Segments of a project are defined in Project Settings. Select a segment of a project from the Segment drop-down under the **Home** ribbon.
HOME RIBBON

Global options and settings

Selections in the Global ribbon will affect all segments and all tables in both the Deterministic and Stochastic modules.

Project Settings

- **Data Structure** - View the size and structure of the tables in the file, and view/modify row and column labels.
- **General** - Enter the project title and other informational text. Note that text in these fields can be referenced in table footnotes and print labels.
- **Segments** - Create one segment for each set of data you will be analyzing (e.g., line of business, coverage, etc.). Each segment will have its own data, assumptions, results, and selections.

Modify Structure

- **Append/Remove Evaluation Periods** - Add or remove development periods (i.e., diagonals on triangles).
- **Append/Remove Exposure Periods** - Add or remove exposure periods (i.e., rows in a triangle) including combining old exposure periods into a Prior row.
- **Append/Remove All Prior Row** - The Prior row can be used to combine several periods of data into one period; for example, this is helpful when there is no further development, or when the company wishes to maintain a consistent structure when appending new evaluation periods.
- **Compress Columns/Rows** - If the original structure contains exposure and/or development periods shorter than years, these commands will compress data and selections appropriately.
(for example, converting quarterly triangles to annual ones). Note that you must save the original file and compressed file under two different names to retain both structures.

**Display Settings**
- **Number** and **Date** format options

**Object Library**
- Access the **Object Library** to see a list of all the tables available in the current file. The **Object Library** also contains options to **Create**, **Edit**, **Delete**, and **Export/Import** User-Defined tables.

**Collection Library**
- Access the **Collection Library** to see a list of all the collections/views provided by the system, some of which will automatically be displayed on the **Home Navigation Pane**. You can also save a new or modified collection or load a previously saved collection.

**Deterministic capabilities**

![Deterministic Options](image)

Selections in the Deterministic options will affect Exhibits and Graphs in all segments in the Deterministic module.

**Exhibit Options**
- **Statistics** - Select which statistics you want to display on various exhibit types for all data elements and segments in the current file.
- **Interpolated Factors** - Select which curves you want to fit to calculate interpolated factors, using Age-to-Ultimate or Ratio-to-Ultimate values from the selected factors. The interpolated factors are only displayed and used when appropriate, based on **Project Settings**.
- **Historical Factors** – Select which historical selected factors display on exhibits. (Whenever a new evaluation period is added to a project, the current period’s selected factors are saved as “historical factors” available for future use. Over time, substantial history will build up in an Arius data file.) The **Save Current SDFs** button on this tab also allows you to save additional sets of selected interpolated factors at the current evaluation date. Refer to *Arius Actual vs. Expected Analysis* under HELP | USER DOCUMENTATION for examples of when this might be necessary.
- **External Factors - Add/Delete** and **Map Segments** – Add external development factors, stored in an Excel file, to the current Arius project. Examples include industry factors (for example, from A.M. Best Aggregates and Averages, RAA, or NCCI) or selected countrywide factors from another analysis being displayed on regional/state analyses.

**Defaults**
- **Data** – Have the system enter values into some or all cells of an “entered” table (one with white cells). Options are to set a value for all blank cells or for all cells, and Fill Blank Value.
- **Exhibits** – Specify default selections for specific exhibits and segments. Can be set for either selected development factors (SDFs) or Interpolated SDFs.
- **Clear Manual Selections** – Choose SDFs, Interpolated SDFs and/or Ultimates for the specified segments.

**Graph Options**
- Select the default number of periods to include in each type of graph. The default can be overridden individually for each table.

**Stochastic functions and capabilities**

Selections in the Stochastic options can affect one or all segments in the data file. Refer to the Arius Stochastic User Guide for more detailed information.

**Model Options**
- **Options** - Selections here will apply to all segments. The system gives you control over the number of iterations to run in a simulation, which percentiles to return in your results, and whether your results should be discounted. You should confirm or edit the information on this tab as a starting point for running stochastic models.
- **Term Discount** – This allows for the use of a yield curve in discounting model results. Entries here will apply to all segments, and are only activated if you selected Enable Discount Rate on the Options tab.
- **Default Model Selection** – Select a default set of models for typical use with most segments, then use the defaults or manually select which models to run for each individual segment in the Choose Models screen.

**Choose Models**
- Select which models to include for the active segment. You can modify these selections for each segment for which you want to run stochastic models.

**Run Diagnostics**
- For an individual segment or for all segments and correlation. Note that this step is separate from running the model itself. This provides a number of elements of key diagnostic information to help you further parameterize your model.

**Suggest Hetero Groups**
- Used for ODP Bootstrap, and applies to an individual segment or all segments. This provides recommended groupings of your residuals by similar distributions, and helps to adjust your model to account for potential heteroscedasticity in your data.
Run Simulations
- For an individual segment or for all segments and aggregation.

Compilation
- Combines stochastic results from multiple projects and model types into one stochastic distribution.

Clear Results
- For an individual segment or for all segments and aggregation.

Where to get help

- **Contact Support** - View the FAQs page for helpful tips, and email or call the Milliman software support team.
- **User Documentation** - Includes help documents for both the deterministic and stochastic modules of Arius.
- **Technical References** - Quick access to some of the white papers referenced in the stochastic models and calculations.
COLLECTIONS

Collections are views of one or more tables on the Home screen, organizing the objects you use in your analysis into a customizable and efficient workflow. For example, the Loss Amounts collection below is displaying three data tables and corresponding bar graphs.

Collections are global in that they are shared across all segments in an Arius project, but they can vary from file to file. Many collections are included with the software and automatically display in the Navigation Pane when creating a new file. Many more are available for your use in the Collection Library. You can also create your own collections by copying an existing collection or creating one from scratch. Collections are also handy for building export and print lists rather than selecting one object at a time.
COLLECTION SETS

All of the collections that group and manage your workflow throughout a project are shown in the project’s Navigation Pane. All these collections taken together for the entire project (the .APJ file) are called a Collection Set. This set supports the workflow for all segments in the project.

Collection Sets are a part of and specific to a particular project. Once you get the collections like you want them in one Arius project/file, you can save the Collection Set for reuse with other projects. The Save Collection Set to File function saves all the information necessary to open these same collections in another Arius project, or to revert back to these collections in the current project at some later date if necessary.

You can import another Collection Set into your current Arius project using the Load Collection Set from File function.

![Collection Set in Arius project](image-url)
DETERMINISTIC TABLE RIBBONS

In addition to the ribbon on the Home screen, each deterministic table has a ribbon of its own.

Cumulative/Incremental

- Toggles between displaying data triangles in cumulative or incremental amounts.

Development/Calendar

- Toggles between displaying data in development triangles or calendar period format.

Graph: Bar (latest diagonal), Series as Rows, Ratio to Ultimate, and Series as Columns

Each type of Deterministic table can be graphed in multiple ways. Once a graph is displayed, click on the Graph Settings icon to select which exposure periods, series, or columns are included (not available on bar graphs) and click on the Graph Styles icon to modify axis, legend, and title fonts and positions.

- Input tables - Bar graph of incremental or cumulative amounts in the last diagonal or line graph of cumulative amounts for each exposure period.
- Exhibit tables – Line graphs of selected Ratio to Ultimate, Series as Rows, and Series as Columns.
- Method and Report tables – Combination bar and line graph of one or several columns in the table.

Show Formula

- Displays the formula for the table or for cells linking to or calculated from other columns or tables.
Source Data

- If there is only one source, the source table opens automatically. If there is more than one source, a list of sources display with an option to select and open one of those source tables.

Calculated Segment

- Allows you to see and potentially override the related segment calculation for each object in a calculated segment.

Edit Footnote

- Allows the entry of footnotes for each table, and optionally to share that footnote with the same table in all other segments in the file. Footnotes can be entered as hardcoded text or can refer to text from various fields in the file. Footnotes print below the related tables when exporting to PDF.

Tail Factor Analysis (available for development exhibits with a Selected row)

- In tables calculating development factors, you can select any row of data on the exhibit, fit a curve to the series, and extend the curve into the future to help estimate a tail. Right-click on the row label text in the left pane and initiate or edit existing tail factor calculations. A second window will open, displaying the results of three different curves fit to the selected data. After making any revisions, you can select which results to display on your development exhibit.

Heat Map (available for any Exhibit as defined in the Object Library)

- Provides conditional format-type coloring of all amounts in an exhibit triangle. The highest number down each column is shaded red, the lowest number is shaded green, and all numbers between those two values are shaded accordingly. Heat maps can be especially helpful in visually identifying trends or outlier diagonals or periods in your data.

Box-Whisker Plot (available for any Exhibit as defined in the Object Library)

- Provides a graphical depiction of the values down each column of an exhibit triangle, with the box indicating those factors in the 25th - 75th percentile, the median depicted by the line in the box, and the whiskers depicting the highest and lowest values in the column that don’t exceed the criteria for being outliers. Outliers are those values exceeding 150% above or below the interquartile range, and they are displayed as an orange dot on the box-whisker plot. When displayed for an exhibit that has selections, the selected value will be displayed as a purple dot on the box-whisker plot. These plots can be helpful in identifying such situations as bias in your selections (for example, all your selections are above or below the median).

Gear (Report Settings) icon

- A Report Settings icon is available on tables with additional structure options. For example, the Report Settings icon on the Comparison of Ultimates reports is used to select which methods to display. On the Future Payments reports, it allows selection of the length of the payment pattern. On graphs, it allows selection of which exposure periods to include.
4. Object library

The Object Library contains a list of every table available in an Arius file. It is the source for building collections, exporting lists, and printing lists, and is where you create, modify, or delete your own tables.

A typical analysis will only use a select subset of all the Arius tables. Many of these tables are displayed on the left Navigation Pane; however, many more are available to help in your analysis. They are stored here in the Object Library and you can pull them into your Navigation Pane as part of your workflow.

The system-provided tables in the Object Library cannot be modified or deleted, though they can be copied and then the copies can be edited. Tables created by the user, whether from scratch or by copying an existing table, will be stored in the User Defined folder under the appropriate node on the tree.

Note

Be sure to browse through the list of Exhibits at least once. They will automatically populate when source data is available, providing a variety of diagnostic information with no additional user intervention.

Data

Generally, tables in the Data section include raw data, assumptions for methods and selected ultimates. A data table can be a triangle, row, column, single cell scalar, triangle index, or formula driven assumption. They can be entered or calculated values and can be referenced directly in formulas. Examples include Paid Loss, Loss Ratios for BF methods, and Ultimate Claims.

Exhibits

Exhibit-type tables are always triangles and are always calculated values with a consistent calculation across the entire triangle. The only entry field in an Exhibit is a row for selecting factors. Exhibits are typically some type of ratio, and they are defined as one of four types in Arius (development, average, ratio, and other). Each type of exhibit can display a different set of statistics. Examples of exhibits include Paid Loss Development, Cumulative Incurred Loss to Ultimate Loss, and Ultimate Claims per Exposure.
Methods

Method-type tables are typically calculating an ultimate that will be referenced in another method or report. These table types are columnar, with each column having its own formula. One column in every Method is designated as the Calculated Ultimate, which can be referenced in a formula in another table. Examples include the Paid Loss Development and the Bornhuetter-Ferguson Using Ultimate Premiums and Incurred Loss methods.

Reports

Report tables are similar in structure to Method tables - columnar with each column having its own formula - but they are more summary in nature and calculated values in a report cannot be referenced in a formula in another table. One example is the Comparison of Ultimates report which allows you to compare method results, calculate a weighted average if desired, and select (using defaults or manually entered) ultimates. Other examples include a Summary of Reserve Estimates and various cash flow reports.

Models & ODP Bootstrap Aggregation

The Models and ODP Bootstrap Aggregation nodes on the tree in the Object Library list all of the tables and graphs in each stochastic model and for the ODP aggregate calculations. These tables are specific to the stochastic module and are described in detail in the Arius Stochastic User Guide.
5. Creating/editing collections

Collections are views of one or more tables on the Home Navigation screen, organizing the objects used in an analysis into a customizable and efficient workflow. For example, a collection might include a set of raw data tables and corresponding graphs or several diagnostic tables reflecting frequency and/or severity. Collections are global in that they are shared across all segments in an Arius project, but they can vary from project to project. Many collections are included with the software and several automatically display in a new project. A complete list of system-provided collections is available in the Collection Library accessible from the Home ribbon.

A collection from the Collection Library can easily be added to or deleted from the Navigation Pane.

- To add a system collection to the Navigation Pane, click the name of the collection in the Collection Library and drag into the desired position in the Navigation Pane.
- To remove a system collection from the Navigation Pane, right-click and select Delete.
- Note that system-provided collections can be removed from the Home Navigation Pane but they are not deleted from the file. They can easily be restored by dragging from the Collection Library back into the Navigation Pane.

You can also create your own collections, either from scratch or by copying an existing collection.

- Create, Copy, Edit, and Delete functionality for collections are performed by a right-click in the preferred node, folder and collection (if appropriate) in the Navigation Pane.
- Once a collection has been created, right-click and select Edit to modify the structure, rearrange existing objects, add new objects or remove existing objects.
- To add objects to a collection (the collection must be in edit mode), open the Object Library and click-and-drag each object from the library to the appropriate position in the collection window.
- Click Save & Close to see the new collection in the Navigation Pane.
6. User defined tables

Arius has hundreds of system tables built in to store data, calculate diagnostics and actuarial methods, and store selections. In addition, you can create your own tables, referred to as User Defined tables. User Defined tables can be built from scratch or by copying another table and editing it as necessary. You can also copy an entire set of User Defined tables from one project to another.

All User Defined table activity occurs from the Object Library.

It might first help to understand table types:

- **A Data table** can be a triangle, row, column, single cell (scalar), triangle index, or formula driven assumption. These can be entry tables or calculated tables. Data tables can be referenced directly in formulas.

- An **Exhibit** is always a calculated triangle and is typically for development factors or other diagnostics. Exhibits are the only table type providing for a row of selected factors that can then be referenced in other formulas.

- **Methods and Reports** are columnar tables, where each column has a different calculation, and all columns are calculated fields. Methods are typically calculating an ultimate while Reports are typically summarizing information from Data, Exhibits, and Methods.

  The major difference between a Method and a Report is that Methods have one column designated as “ultimate” which can be referenced in other formulas. Columns in a report cannot be referenced directly from another table.

The easiest way to create a User Defined table is to find an existing Arius table that is close to the type of table you need, copy it, and edit it as appropriate.

1. In the **Object Library**, navigate to the table you wish to copy. Either right-click on the table name and select **Copy** or click once on the table name to select it and click the **Copy** icon in the ribbon. Enter a new name and click **OK**.

2. You will automatically be taken to the **User Defined** folder in the appropriate node on the tree where your new table is saved. To edit the table, either right-click on the table name and select **Edit** or click once on the table name to select it and click the **Edit** icon in the ribbon.

To create a table from scratch:

1. Select **New** from the ribbon in the **Object Library** and select the table type.
   - For Input and Exhibit tables a window displays to name the table, set formats, and enter formulas for the table’s calculations.
   - For Method and Report tables the same window displays but you can click in each column to select column-specific formats and formulas.

2. Refer to Arius Deterministic Formula Functions for details about each function available for building formulas. It is accessed from **HELP | USER DOCUMENTATION** on the **Home** ribbon.
7. Sample Deterministic analysis

1. Create a new Arius project using FILE | NEW.
   - Select either Create a New Arius project or Create a New Arius Project from a ReservePro file.
   - Note that much of the information below in step 2 will be automatically set upon importing a ReservePro file. Click Project Settings on the Home ribbon to review or modify these fields.

2. Provide basic information about the data you will be entering and working with in the Project Settings screens:
   - Use the Data Structure tab to define the size and structure of the triangles in the project.
   - Use the General tab to enter project information and notes.
   - Use the Segments tab to add all of the lines of business or coverages you will work with in this project. Each reserving segment will have its own data, models, and assumptions. (Note that you can also come back and add additional segments to this file later.)
   - Click OK on the bottom of the Project Settings window to finish creating a new file.

3. Enter or import the data necessary for your analysis:
   Copy and paste or use the API to import from Excel, then review the data in NAVIGATION PAN | DATA | OBJECT LIBRARY | DATA | INPUTS.

4. Define preferences for exhibits:
   DETERMINISTIC RIBBON | EXHIBIT OPTIONS
   - Specify which statistics to display on development and other exhibit types.
   - Define which curves to display for interpolation (if required). Interpolation will only be displayed on development exhibits if the file structure identifies a partial period in the last diagonal, as shown in Project Settings.
   - Select external development factor sources (e.g., NCCI factors, etc.) and map them to appropriate segments. These can then be displayed on your exhibits. A file named SampleIndustry_FactorLibrary.xlsx shows an example of using an external source and is provided in C:\...Documents\Milliman\Arius\DemoFiles.

5. Review diagnostics to better understand what’s going on in your data with NAVIGATION PAN | DATA DIAGNOSTICS.
   - A complete list of available diagnostics tables is in OBJECT LIBRARY | EXHIBITS.

6. Review and select development factors:
   NAVIGATION PAN | DETERMINISTIC OR OBJECT LIBRARY | EXHIBITS
   - Click on the Heat Map icon on the table ribbon to activate the heat map.
   - Exclude factors in the calculated triangle by selecting one or more cells then right-click and select Exclude Factor(s) from Statistics?
   - Set default development factor selections by right-clicking in the appropriate cells and/or statistics row labels and selecting Set as Default.
   - Make any manual adjustments to the default factors by entering them in the Manual Selected row.
- Run tail factor analysis by clicking on the text in the left pane beside the row of factors you want to fit the curves to (for example, this is often the Selected row), then right-click or click the Tail Factor Analysis icon in the ribbon.

- View box-whisker plots by clicking on the Box-Whisker Plot icon on the table ribbon to identify unusual outliers or any potential bias in your selections.

7. Review/update reserving methods:
   NAVIGATION Pane | DETERMINISTIC or OBJECT Library | METHODS

8. Compare methods and select ultimates:
   NAVIGATION Pane | DETERMINISTIC | LOSS SUMMARY or OBJECT Library | REPORTS | COMPARISON OF ULTIMATE XXX ESTIMATES.
   - Click the Report Settings icon to select which methods to display, and optionally display an average or weighted average of those methods.
   - Once the appropriate methods are displayed, set default selected ultimates by right-clicking in the desired cells and selecting Set as Default.
   - Make any manual adjustments by entering the adjustments in the Manual Selected column.

9. Review reasonableness of results:
   From the Navigation Pane, review Data Diagnostics and Deterministic, or from the Object Library review Exhibits and Reports.
   - Review the Summary of Reserve Estimates report.
   - Review the Post-analysis Diagnostics collection exhibits.
8. Sample Stochastic analysis

If you already completed the deterministic analysis in Arius, skip to step 4.

1. Create a new Arius project using File | NEW.
   - Select either Create a New Arius project or Create a New Arius Project from a ReservePro file.
   - Note that much of the information below in step 2 will be automatically set upon importing a ReservePro file. Click Project Settings on the Home ribbon to review or modify these fields.

2. Provide basic information about the data you will be entering and working within the Project Settings dialogue:
   - Use the Data Structure tab to define the size and structure of the triangles in the project.
   - Use the General tab to enter project information and notes.
   - Use the Segments tab to add all of the lines of business or segments you will work with in this model; each reserving segment will have its own data, models and assumptions.
   - Click OK on the bottom of the Project Settings window to finish creating a new file.

3. Enter or import data:
   - Copy and paste or use the API to import from Excel, then review the data in Navigation Pane | Data or Object Library | Data | Inputs.
     - Paid Loss and/or Incurred Loss data
     - Earned Premiums, Ultimate Premiums and/or Exposure data
     - Closed Claims and/or Reported Claims data

4. Set model options:
   - Click on Model Options on the Stochastic ribbon.
     - Use the Options tab to change any of the Global Options used with all stochastic models or either of the ODP Bootstrap Options which are only used with the ODP Bootstrap models for all segments.
     - If you selected the Yes, Term option of the Enable Discount Rate? field, then use the Term Discount tab to either manually enter or select from a lookup table a discount rate yield curve.
     - Use the Default Model Selection tab to select the models you expect to typically use for every segment.
     - Click OK on the bottom of the Model Options window to save your changes.

5. Below the Home ribbon, use the Segment drop-down list to select one of the reserving segments.

6. In the Stochastic | ODP Bootstrap | Model Assumptions area of the Navigation Pane:
   - Select General model options for this segment.
   - Enter Bornhuetter-Ferguson and/or Cape Cod assumptions if applicable.

7. From the Home ribbon, click on Run Diagnostics and select Run Diagnostics for {segment} to fill the exhibits and graphs with diagnostic information.
8. In the Stochastic | ODP Bootstrap | Paid Loss | Diagnostics areas (and/or Incurred Loss) of the Navigation Pane, respectively:
   - Review the patterns in the Residual Graphs. Adjust for heteroscedasticity as necessary using the Select Hetero Groups Graphically window and/or using the Suggest Hetero Groups icon and select the Suggest Hetero Groups for (segment) option from the Home ribbon if desired.
   - If using the icon to Suggest Hetero Groups, you will need to enter values in, or copy and paste into, the Group Number row in the Heteroscedasticity table.
   - Review the Normality (Q-Q) Plot and Box-Whisker Plot in the Normality window to determine if you need to exclude any outliers.
   - To remove an outlier, you can either click on the appropriate dot in the Residual Graphs window (the dot will turn red once selected as an outlier) or you can identify the correct cell with a one (“1”) in the Outliers table.
   - After selecting (or changing) hetero groups and/or outliers, you will need to use the Run Diagnostics icon again to recalculate all of the diagnostic statistics with the effects of the heteroscedasticity adjustments.
   - Use the Tail Factor window to enter tail factor assumptions, such as whether to simulate a new tail for each iteration, etc.

9. Run the simulations for this segment using Run Simulations and selecting the Run Simulations for (segment) option from the Home ribbon.

10. In the Stochastic | ODP Bootstrap | Paid (and or Incurred) Loss | Model Name areas of the Navigation Pane, respectively:
    - Review the simulation results in all the tables and graphs for each model; and
    - Interactively adjust model options and re-run the diagnostics and/or simulations until you are satisfied with the model fit and simulation results for each model.

11. Repeat steps 6 to 10 above for the Mack Bootstrap and Hayne MLE models, as desired. These models provide less options for parameterization than the ODP ones, but have similar output. To activate these models for each segment, you must have selected them as part of your Default Model Selection options in step 2 above, or you can use the Choose Models icon from the Home ribbon to customize which models you use for each segment.

12. In the Stochastic | ODP Bootstrap | ODP Summary | Assumptions area of the Navigation Pane, enter weights by accident period for each model in the Model Weights table and simulate again to get the initial “best estimate.”

13. In the Stochastic | ODP Bootstrap | ODP Summary | Summary Results area of the Navigation Pane:
    - Review the simulation results in all the tables and graphs for “best estimate” of the distribution;
    - Optionally, change the weights entered by accident period in step 12 above, re-simulate the “best estimate,” and review the simulation results again; and
    - Compare stochastic and deterministic “best estimates” and, optionally, enter selected total unpaid from your deterministic analysis in the last column in the Deterministic Calculations table, click to check the Use Selected Unpaid as Mean checkbox, and re-simulate. This will shift results so that the mean of the distribution will match the deterministically selected total unpaid.
14. Repeat steps 6 to 10 above for each segment in the model.

15. From the Home ribbon, click on the Run Diagnostics icon and select the Run Diagnostics for All Segments & Correlation option which will not only update all the diagnostic results for all the segments, but it will also generate the correlation matrix tables on the ODP Bootstrap Aggregation area of the Navigation Pane.

16. In the ODP Bootstrap Aggregation | Assumptions | Correlation area of the Navigation Pane:
   - Review the various correlation matrices that are calculated for you in the calculated table.
   - In the User Selected window, enter correlation coefficients for each pair of segments, or use one of the Quick Fill buttons to fill the correlation matrix either with values from one of the calculated tables that Arius has provided as suggestions or with the same value for each pair.
   - You may also change the Degrees of Freedom for the T-distribution (T-Dist DoF) to be used in the correlation process in the User Selected window.

17. From the Home ribbon, click on the Run Simulations icon and select the Run Simulations for All Segments & Aggregation option to run simulations for all segments and generate a final overall distribution taking into account the effect of correlation between the segments.
9. Exporting from Arius

Exporting data and tables from Arius can be performed in several different ways.

- Export to Excel
- Export to PDF
- Read and write using the API and a programming language (most common is VBA in Excel).

There are two menu items for exporting tables from Arius: Export to Excel and Export to PDF.

**EXPORT TO EXCEL**

1. Select File | Export to Excel
2. Drag individual tables from the Object Library or groups of tables from the Navigation Pane into the Export window to create a list of tables to export. (If you save the list in step 3, you will not need to complete steps 2-3 next time; you will simply click Open List and navigate to the list you saved earlier.)
3. Click the Save List icon to save this list for future use with this or any other Arius project.
4. Check the boxes to select which segments to include.
5. Click Export. A new Excel file will be created with one worksheet for each segment.

**EXPORT TO PDF**

1. Select File | Export to PDF
2. Drag individual tables from the Object Library or groups of tables from the Navigation Pane into the Export window to create a list of tables to export. (If you save the list in step 5, you will not need to complete steps 2-5 next time; you will simply click Open List and navigate to the list you saved earlier.)
3. Double-click the Page Setup entry in the first row to define initial settings for layout, headers/footers, and fonts.
4. Insert page setup changes within the list using icons in this window. For example, you could print the first three or four pages as portrait and then insert a new page setup to shift to landscape for the next several pages.

5. Click the Save List icon to save this list for future use with this or any other Arius project.

6. When the list of tables and settings is complete, click the Export button.

7. Check the boxes to select which segments to include, and optionally change the path or resolution, then click OK to create one PDF for each segment.

APPLICATION PROGRAMMING INTERFACE

An application programming interface (API) in Arius allows external tools to read from and write to Arius tables. The most common tool is Excel, using the Visual Basic for Application (VBA) programming language.

Several examples of using VBA in Excel to read and write Arius table data are installed with Arius and can be found in C:\...Documents\Milliman\Arius\API\ExcelVBA Samples.

A user manual for the API, the Arius API User Guide, can be found from HELP | USER DOCUMENTATION.