Arius

2022a

Release Notes and
Installation Instructions

Milliman

IT TAKES VISION

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Milliman, Inc.
3424 Peachtree Road NE, Suite 1900
Atlanta GA 30326 USA

Tel +1 800 404 2276
Fax +1 404 237 6984

ActuarialSoftware.com

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This document originally issued in September 2022 with Arius build 2022a.17347.
Reissued with edits in December 2022 with Arius build 2022a.17461.

1. Release notes

RELEASE 2022a ADDS SEVERAL NEW CAPABILITIES

What's new in Arius Deterministic

1. **New Search Capability added to the Object Library toolbar**

   We have added a new **Search** text box to the toolbar of the Object Library to help you in navigating to the desired table within Arius. Simply type the text you would like to search for and press **Enter** or the **Search** icon. In the left-hand navigation panel, the system will show which folders have tables with the text within the Table Name.

   For example, if you type in "Proportion", the system will show a (5) in red text to the right of the Data Node and again to the right of the Assumptions folder. When you navigate to this folder, you will see the five tables with the text "Proportion", including the "Selected Proportion Earned" array that is used to prorate the ultimate losses when calculating indicated reserves.

   To clear the search to view all tables again, click the red **X** to the right of the Search text box.

2. **Ability to easily Highlight Diagonal(s) within an Exhibit**

   Due to recent industry-wide shocks such as the COVID-19 pandemic, you may wish to exclude diagonals of development factors from your exhibits when calculating averages and statistics. We have added a new **Highlight Diagonal(s)** right-click option on all exhibits. Simply select any cell or number of cells in the upper portion of an exhibit, right-click and select the option for **Highlight Diagonal(s)**. This action will highlight all the cells along the diagonal(s) at which time you can then right-click and select the **Exclude Factor(s) from Statistics** or **Include Factor(s) in Statistics** option.

   Note: you cannot exclude factors that currently have a purple border due to the right-click **Smoothing** feature as the **Exclude Factor(s) from Statistics** option will be disabled.

3. **Several new functions to help with creating more dynamic user-defined objects**

   The Arius system tables and built-in functions have always used the previous diagonal within a project file as the basis for comparison. For example, when using the GetPriorSDF() function, only the SDFs directly attributable to the analysis of the previous diagonal were accessible. It is often the case that the basis for comparison is not the previous diagonal, but a changing number of evaluations prior to the current one (when comparing to a prior year-end within a quarterly development project, for example).

   To allow for this more dynamic behavior within user-defined arrays, we have introduced three new versions of existing functions, which allow you to reach back within a project file to access historical development factors or diagonals from evaluations other than the immediately preceding one. These functions are found in the **Functions** section of the user-defined Formula Editor window.

- **DiagonalX ()**

  This function is an updated version of the Diagonal() function, which requires two parameters. The first parameter references the array from which you want to retrieve the diagonal and the second parameter is a scalar that references which diagonal (1 = most

recent).

Example: *DiagonalX (Cumulate ("Historical Ultimate Loss") , 5)*
or: *DiagonalX (Cumulate ("Historical Ultimate Loss") , "UDOScalar")*

Note: DiagonalX ("Triangle",5) functions identically to Diagonal5 ("Triangle").

- **ShiftX ()**

  This function is an updated version of the Shift() function, which requires two parameters. The first parameter references the array that you want to shift and the second parameter is a scalar that references the number of cells to shift (e.g. left for row array, down for column array).

  Example: *ShiftX ("Paid Loss Development (SDF) ", 4)*
  or *ShiftX ("Paid Loss Development (SDF) ", "UDOScalar"-1)*

  Note: ShiftX ("Array",3) functions identically to Shift (Shift (Shift ("Array")))

- **GetPriorSDFx ()**

  This function is an updated version of the GetPriorSDF() function which requires two parameters. The first parameter references the array of selected development factors you want to retrieve from the Historical Factor Library and the second parameter refers to the number of **months** to subtract from the current valuation date to determine which factor set to return from the Historical Factor Library.

  Example: GetPriorSDFX ("Paid Loss Development (SDF) ", 12) or GetPriorSDFX ("Paid Loss Development (SDF) ", ("UDOScalar "-1) * 3)

To demonstrate these functions working together within a custom Actual vs. Expected Table, you could create a scalar object called “UDOScalar” to represent which diagonal to compare to within your Actual vs Expected analysis, and then copy (for example) **#118 Actual vs Expected Using Prior Selected Paid Loss Development and Prior Indicated Loss Reserves** and edit the following columns:

Column 1 = **DiagonalX** (Cumulate ("Historical Ultimate Loss") , "UDOScalar")

Column 2 = **DiagonalX** (Cumulate ("Paid Loss") , "UDOScalar")

Column 4 = **DiagonalX** (Cumulate ("System Development Ages") , "UDOScalar")

Column 5 = ConvertRowToCol (Invert (**ShiftX** (Invert (1 / CumulateSDF (**GetPriorSDFX** ("Paid Loss Development (SDF)" , ("UDOScalar" - 1) * 3))) , "UDOScalar" - 1)))

Column 7 = ConvertRowToCol (1 / CumulateSDF (SpreadTail (GetPriorSDFX ("Paid Loss Development (SDF)" , ("UDOScalar" - 1) * 3))))

4. Ability to Export Historical SDFs to CSV file

We added the ability to **Export Historical** Factors to a CSV file on the Exhibit Options|Historical Factors toolbar. Simply click this button, provide a filename, and all development factors in your Historical Factor Library will be exported.

This feature is useful for reviewing the GetPriorSDFX function above to verify the correct factors are being retrieved and may also be useful when confirming how the system is interpolating and/or extrapolating factors when Historical Factors are displayed on exhibits.

5. **New Reporting Tables for IFRS 17**

To support our clients who are subject to IFRS 17 Regulatory Requirements and using the **Standard Formula** (without the **Other Comprehensive Income** selection), we have added new system tables to calculate the Total Insurance Service Expense and the Total Insurance Finance Expense. These items are derived separately for Loss and ALAE (Net of Salvage and Subrogation) and ULAE.

These new tables can be found in the REPORTS|SPECIAL REGULATORY|IFRS 17 folder within the Object and Collection Libraries. Additional inputs and methods underlying these reports can be found in the INPUTS | ASSUMPTIONS and METHODS | SPECIAL REGULATORY|IFRS 17 folders respectively.

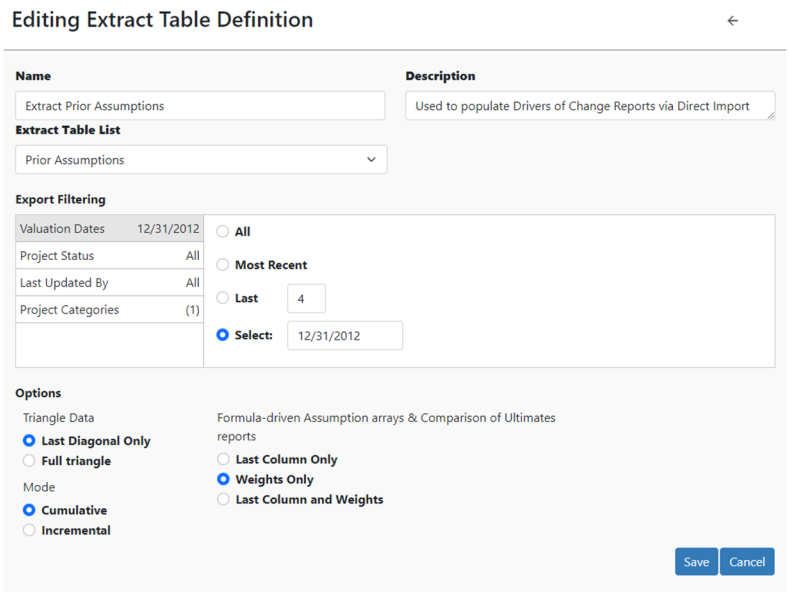
An example of the implementation of these tables can be found in the Arius_Sample.apj file.

What's new in Arius Enterprise

Ability to extract Weights arrays to an Extract Table

Any Comparison of Ultimate Report or Formula Driven Assumption array that includes a Weighted Average column also includes columns that correspond to the weights given to the various methods included in the table. These weights can now be extracted to the Extract Data Table by dragging these tables to the Extract Table List window available via the Enterprise tab within Arius.

Once these tables have been included, you have the option to select **Weights Only** when creating your Extract Table Definition.



FIXES AND USABILITY IMPROVEMENTS IN THIS RELEASE

Arius Deterministic

- Fixed an issue where the PVFactors array was getting cut off too soon causing the last few payments to not be properly discounted in cash flow reports. This only occurred when using asymmetrical triangles and for a particular number of extrapolation periods.
- Arius will no longer allow LDF factor smoothing over blanks or zeros. This change prevents a scenario in which volume-weighted average statistics may be distorted due to a convergence issue in the calculation of the smoothed factors.
- Fixed an issue where Arius would only print the Default graphical view of a Formula Driven Assumption. Any customized graph settings will now flow through when Exporting to PDF.
- Modified the Arius API to function when the file path contains special characters.

Arius Enterprise

- Modified Extract table process to ensure that wide format extract tables will have measures listed alphabetically, thus a more consistent order.
- Modified the saving process to prevent timeouts when saving large project files.
- Mid-November 2022 update: The original Arius 2022a build #17347 was updated to build #17454 in November 2022.
    - We fixed an issue related to the last column on Comparison of Ultimates reports and Formula-Driven Assumptions (FDA) arrays not updating properly when opening a project from the Arius Enterprise site portal. This was only an issue for projects
        - with no factors stored in the Historical Factor Library, *and*
        - where External Factors were being used as a default assumption for development method ultimates.
- Mid-December 2022 update:
    - We fixed an issue where users could not save and check-in an Arius Enterprise project to the database with an outdated UDO library, wherein either they or another user had made newer updates to the UDO library before the current project was checked back in. The user would receive an error message in the Arius desktop application that said "Failed to save project to database."
    - We fixed a scenario where resizeable row arrays—e.g., Payment Patterns—are not refreshing appropriately (they display all blanks except for a 1 in the last cell) in Arius Enterprise projects in the following situation:
        - the re-sizeable row array is using a formula-driven payment pattern, and
        - the specified exhibit has default selections (green boxes) that reference external factors, and
        - there is no historical factor library in this Arius project.
    - The issues resolved in the November and December updates did not not affect Arius Deterministic Desktop system users; they was strictly limited to Arius Enteprise.

Triangles on Demand

- Fixed an issue in creating triangles when a measure matched a SQL reserved word (e.g. Open) and this measure was then included as a calculated measure.
- Modified the advanced query builder to allow for dimension names containing "_SK".
- Improved the functionality and performance of drill-down when using calculated measures.
- Made various changes to prevent database activity while performance settings are being changed.
- Prevented users from starting concurrent deletes in a database.
- Improved messaging around queuing of successive loads in the ToD Web Portal.

FILE COMPATIBILITY

The 2022a system opens and functions with files from any previous version of Arius.

Any files created or saved in Arius version 2022a *will not work with earlier versions of Arius*, and as such, they cannot be opened by others on your team who do not have version 2022a of Arius.

TELEMETRY DATA

For purposes of future enhancement, Arius has the means to gather data on the use and performance of specific features as well as general usage statistics of the software. It does not have the ability to relate any such usage to specific users.

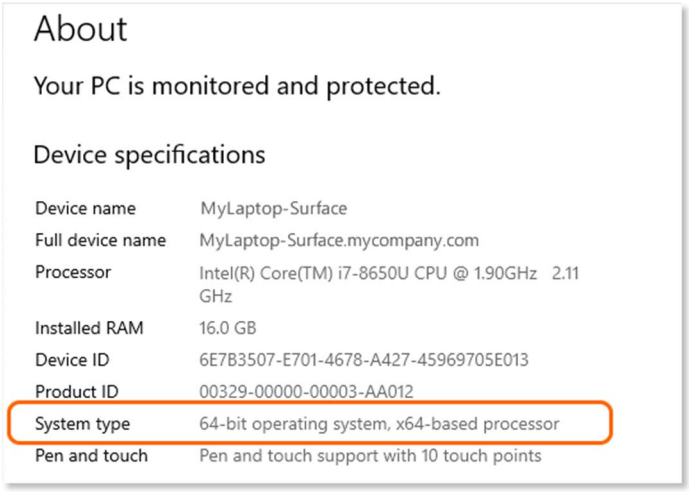
2. Installation requirements

System requirements for the basic Arius system are as follows:

- Minimum operating system: Microsoft Windows 10, 64-bit version
- Minimum hard disk space: 5 GB
- Minimum RAM: 8 GB, though more is recommended
- Related tools: Microsoft Office 2007 or newer (Arius does not support Microsoft Office XP). Arius and its API support both 32-bit and 64-bit versions of Microsoft Office. Arius requires the Microsoft .NET Framework 4.7.2 or newer and Microsoft Visual C++ 2015-2022 Redistributable (x64). Many Windows installations may already have this; you can confirm it at CONTROL PANEL | PROGRAMS AND FEATURES.
- An Internet connection for license authentication at http://admin.actuarialsoftware.com

To assure that your Windows system is a 64-bit version:

Select **Start** and type **Control Panel**. Click on **Control Panel** and select **System**. You should see something similar to the window below.



3. Installation instructions for Arius Deterministic and Stochastic

Note: Administrator privileges are required to perform this installation.

In most cases, this is a multi-step installation process. You will:

1. **Run the install program** for the new Arius software.
    - If there is already a version of Arius installed, the installer uninstalls that copy. This DOES NOT affect any existing data files.
    - If this is a new installation of Arius, or an upgrade from a version prior to Arius 2021b, it will likely also require an install of the MATLAB runtime.
2. If you are directed to install the MATLAB runtime, once it completes, **re-run the Arius installer**.

To install this software:

1. Close any existing version of Arius and all Excel workbooks before beginning the Arius installation.
2. Click the **Download** link and **Save** (*do not Open*) AriusSetup_v2022a.exe onto your computer.
3. Locate the downloaded file. **Right-click** on the EXE file and select **Run as Administrator**. Most users will first be instructed to download and install a new copy of the MATLAB runtime system.
    - If prompted to download the MATLAB installation, select **Yes** to download the runtime installer. (This file is large and will take several minutes to download.) The system downloads a ZIP file containing the MATLAB installer.
    - Once downloaded, locate the ZIP file, MATLAB_Runtime_R2020b_Update_6_win64.zip. Right-click on the ZIP file and select to Open with >> Windows Explorer. Note: *opening the ZIP file with Winzip or a similar upzip program could result in errors*.
    - Double-click SETUP.EXE in the ZIP file to run the install program.
    - Follow the instructions to install the MATLAB runtime. This is a fairly large install; it will take a couple of minutes to appear to start and then a few minutes to run.
4. Re-run the AriusSetup_v2022a.exe install. **Right-click** on AriusSetup_v2022a.exe and select **Run as Administrator.**
    - You may also see the system installing the Microsoft Visual C++ 2015-2022 Redistributable (x64) library. This is required for Arius 2022a, and if it is not present on your computer, the install routine installs it from the Microsoft downloads server.
    - Arius also requires that the Microsoft .NET Framework version 4.7.2 is installed with your operating system. This is likely already true for most users. However, if the installation routine detects that this is necessary, your IT team may need to download this from Microsoft and install it.
5. Once the installation is complete, you can delete the MATLAB installer ZIP file and the AriusSetup_v2022a.exe installer file.

   This release installs MATLAB Runtime 9.9. You can go to **Control Panel | Features and Programs** and uninstall versions of the MATLAB runtime earlier than 9.9 if they are not used by other

applications on your computer.

4. Additional information

After installation, the application is listed as **Arius** in your START|ALL PROGRAMS listing.

The system installs with five sample project files. They can be found at:

C:\Users\<yourname>\Documents\Milliman\Arius\DemoFiles

or perhaps displayed as

Libraries\Documents\Milliman\Arius\DemoFiles

- **Arius_Sample.apj** – Sample data with 5 segments, a mix of short-, medium-, and longer-tailed lines of business. This file 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 not all segments work with all models (like in the real world).
- **Arius_Sample_Canadian.ap**j – Sample WC data for Gross, Net, and Ceded layers. This file includes sample user-defined tables for calculating the Reinsurance Provision for Adverse Deviation as described in the User Documentation Canadian Provision for Adverse Deviations and the section on Calculation Across Layers.
- **Arius_Stochastic_Sample.apj** – Sample data with 4 segments, showing a detailed implementation of all four families of stochastic models. This file is an updated version of the ODP_Mack_Hayne.apj file, revised as of Arius 2020b) to include the Generalized Linear Model.
- **Arius_GLM_Case_Studies.apj** – Includes 5 different data sets or case studies to help explain several ways models can be parameterized to fit the sample data. This file accompanies the case studies in the back of the User Documentation Getting Started with the Generalized Linear Model.
- **Hayne_Paper.apj** – Contains the data used in Dr. Roger Hayne's paper on Maximum Likelihood Estimator approaches, A Flexible Framework for Stochastic Reserving Models.