NX programming and customization

Extending and tailoring NX digital product development solutions

Benefits
- Preserves critical knowledge and design intent from the design process all the way through to the manufacturing process
- Enables companies to capture, re-use and consistently apply best practices across the spectrum of their product lines, thus enabling lean design initiatives
- Quickly automates repetitive tasks and allows users to capture and share workflow processes in scripted files from journaling sessions
- Supports rapid application development through the industry's first Common API design
- Facilitates language freedom – you can choose your preferred automation language
- Facilitates deep integration with language-specific IDEs (integrated development environments)
- Provides complete access to NX core application functionality from any supported language

Summary
NX™ programming and customization software tools help companies extend and tailor NX solution capabilities to their specific needs. Supporting the knowledge-driven automation capabilities of NX, these tools can be employed by product development personnel and application developers.
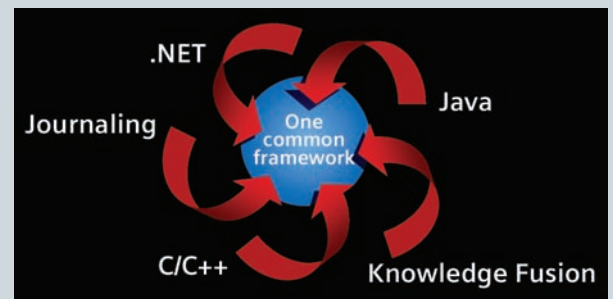
The NX Common Application Programming Interface (API)
NX software provides an automation architecture that serves as the foundation for all NX APIs as well as for a new journaling utility. Called the Common API, it combines the power of journaling and automation with the freedom of a language-neutral platform. Integrated within the core NX architecture, the Common API is the foundation for all NX solutions and is fully compatible with the existing Open C API.

Knowledge-based application development

Knowledge Fusion
Knowledge Fusion is a fully integrated knowledge-based engineering (KBE) tool that permits knowledge-based extension of NX by the end user. Compared to traditional KBE technologies, the tight integration of Knowledge Fusion into the NX digital product development system provides a significant advantage in the industry. Knowledge Fusion permits the creation of powerful applications that take advantage of engineering knowledge. It

NX is built on an automation architecture that provides a common foundation for automation and programming.

supports the capture and re-use of design intent and user intelligence to increase design speed and productivity while intelligently controlling change propagation.

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NX programming and customization

Benefits *continued*
- Supports identical automation capabilities for all programming languages
- Provides direct automation access to Microsoft's extensive .NET library and Java packages of re-usable software
- Preserves automation investments through compatibility with legacy Open API with customized interaction environments
- Allows access to cross-platform model data in diverse networked environments

Features
- Flexible solutions for automation and customization – for product development personnel as well as programmers
- Software technologies to enable users to easily embed design knowledge and engineering rules in programs
- Common API – a single foundation for automation in a variety of languages
- Language-neutral programming platform
- Powerful journaling utility for lightweight automation of NX sessions
- Capability for recording NX interactive operations in any supported language
- Menu and dialog customization
- Data model customization

Designers and application developers can work with Knowledge Fusion directly within the NX user environment to create rules that capture design intent. These rules can be used to drive product design, ensuring that engineering and design requirements are fully understood and fully met. Knowledge Fusion delivers new cost and time savings and raises quality by standardizing design processes, enforcing sourcing practices and incorporating upfront the manufacturing and performance constraints into the design environment.
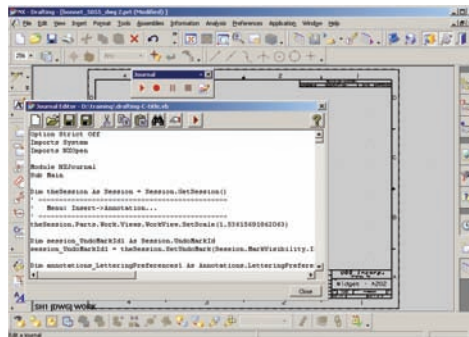
Availability and packaging
The ability to execute applications developed with Knowledge Fusion is included with all NX Mach Series solutions as a runtime license. Knowledge Fusion Author programming is available as an add-on software package for all NX Mach Series solutions.

Easily record and replay interactive sessions

Journaling
The Journal capability is a rapid automation tool that records, edits and replays interactive NX sessions. Based on the programming language Visual Basic .NET and C#, it produces a scripted file from an interactive session of NX which can be run at a later time to replay the

A journaling tool in NX records interactive sessions and allows editing and replay. This capability can be used to quickly automate repetitive tasks.

session. These sessions can be edited and enhanced with simple programming constructs and user interface components to produce a rapidly generated customized program.

Journal files can be used as a basic technique for automating repetitive workflow. Because journals are based on the Common API, they can be used as a template for working automation code in any of the supported automation languages.

Availability and packaging
The journaling capability is included with all NX Mach Series solutions as an integral feature.

NX Open Common Application Programming Interface (API)
The new Common API offers the following features:
- Language support – Provides a native .NET API that supports all .NET languages including Visual Basic .NET and C#. The Java and Open C++ APIs support the full range of Common API capabilities.
- Support for standard integrated development environments (IDEs) – Visual Studio .NET development environment is the industry standard IDE for developing .NET programs. It provides state-of-the-art browsing, editing, debugging, graphical layout of dialogs (WinForms and WebForms) and a unified IDE for web, desktop and mobile development needs. Visual Studio .NET is the recommended IDE for developing NX Open .NET programs. Similarly, Java integrated development environments – Eclipse, Netbeans, etc. offer development of platform-independent Java automation programs which may use the JFC/Swing API for interactive user interface. Custom programs using NX Open for Java API can utilize any of the industry standard Java IDEs for application development.

- Application development – Supports rapid application development by offering streamlined, object- oriented class hierarchies. The Common API is exposed through the object browsers offered by Visual Studio and Java IDEs.
- Coverage – Provides the same automation coverage as available from the Open C API.
- Remoting – Offers full remote execution support based on .NET remoting which is compatible with COM-based solutions, or on Java RMI (remote method invocation). Java RMI is platform-independent.
- Help – Supports Common API documen-tation, which is fully integrated into the Visual Studio integrated development environment and is easily displayed in the Visual Studio Help format. Full Java Common API documentation is presented in the standard JavaDoc style.

NX Open for .NET API
NX offers an API for use with Microsoft's . NET framework. Built on the Common API, this interface provides programmatic access to NX core application functionality, making it possible to create advanced automation programs using any of the .NET-compliant languages, including Visual Basic .NET and C#. Because the API is built on the .NET framework, users can take full advantage of all the benefits provided by that framework.

NX Open for Java API
The Java API supports platform-independent programming access to NX through the Common API using the industry standard Java language. Use of Java JFC/Swing methods provides interactive interfaces in applications. Journals can be recorded in Java, which can then be edited and compiled outside of NX. The Java API supports interactive, batch and remote execution.

NX Open for C++ API
Open C++ is a native C++ version of the Common API, an object-oriented interface to NX. Written in C++, this API takes full advantage of object-oriented features including inheritance, encapsulation and polymorphism. Open C++ provides complete access to its class hierarchy, allowing customers to override methods, derive their own classes and create entirely new, persistent objects in NX. NX Open C++ is fully compatible with the existing Open C API. NX Open C++ also provides a fully extensible data model, allowing customers to define new types of objects that can be treated just like standard NX objects and stored persistently in NX part files. Journals can be recorded in C++, which can then be edited and compiled outside of NX.

NX Open for .NET takes advantage of the Microsoft integrated development environment by providing access to object documentation directly from the Visual Studio object browser.

Open C API
The Open C API is a direct programming interface to NX that allows users to create custom applications using the popular programming languages C and C++. It is used by NX developers, customers and alliance partners to produce unique applications to augment NX or to act as completely separate utilities. Open C also provides a fully extensible data model, allowing customers to define new types of objects that can be treated just like standard NX objects and stored persistently in NX part files.

The Open C API has consistently been rated higher than those of competitors in terms of completeness and usability, and has been recognized as one of the most stable and reliable APIs from release to release (based on the number of deleted and changed functions relative to total number of functions).

API availability and packaging
All of the NX language APIs are included in the NX Open Toolkits Author software package, available as an add-on for all NX Mach Series solutions. Applications developed and executed using any of the APIs require individual NX feature licenses at runtime for the capabilities used in the program.

User interface customization tools

NX menu customization
MenuScript is a tool that allows end users and third-party developers to use ASCII files to edit NX menus and create custom menus for their own applications in an integrated, seamless manner. Menu files support custom tailoring of the main menu bar and the quick view popup menu. Manufacturers can create specialized menus and user interface dialogs, exposing and augmenting only the NX functions required in the custom workflow process.

MenuScript supports pre- and post-actions for menu items for both standard NX menu items and those provided by third-party applications developed with Open C and C++. MenuScript also provides a Menubar Report tool to help review menu customization, diagnose problems and assist in upgrading to future NX releases. A drag-and-drop menu customization interaction is also available.

Availability
MenuScript menu customization is included in all NX Mach Series solutions.

NX Dialog Designers

NX Dialog Designers provides two visual dialog box builders to create NX style dialogs for use in custom programs: Block Styler and User Interface Styler.
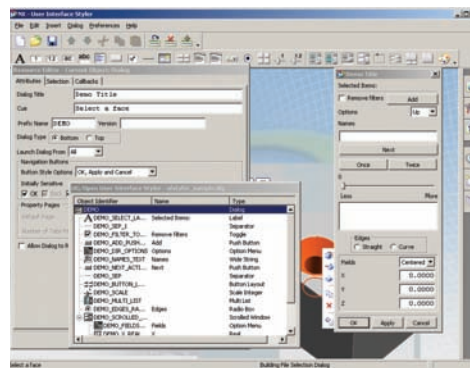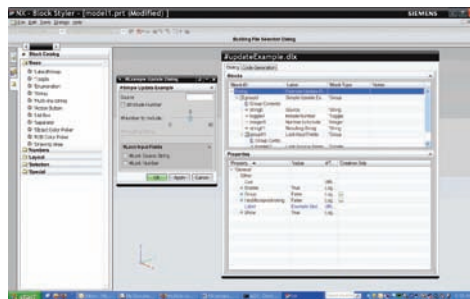
Using a point-and-click interface, users can develop dialogs for Open applications with a minimum amount of time and effort. No previous experience with Windows SDK or X/Motif is required. NX Dialog Designer manages these complexities to create platform-independent dialogs, with interactive object selection, design logic, selection filter, selection scope, input validation and macro support built in. NX Dialog Designers include a template code generator for easy integration with custom application. Code generator supports C++, VB .NET, C#, Java and KF.

Block Styler

Block Styler is a visual user interface builder that makes it possible to interactively design portable NX-style block-based dialogs. Block-based dialogs are NX standard for all new dialogs. Used internally by Siemens developers, Block Styler provides the application module, dialog builder, objects, libraries and documentation necessary to interactively create production-ready dialogs. Block Styler is the recommended dialog designer for all new third- party dialogs.

User Interface Styler

User Interface Styler is a visual dialog builder and is recommended for maintaining existing custom dialogs. User Interface Styler provides application module, dialog

The User Interface Styler streamlines creation of interactive dialogs.

builder, objects, libraries and documentation. And this tool is necessary to interactively create production-ready dialogs and easily integrate them into custom applications using the template code generator included with User Interface styler.

Availability and packaging

NX Dialog Designers is available as an add-on application for all NX Mach Series solutions. Applications that include dialogs designed with NX Dialog Designers can be run by any NX Mach Series solution.

Tools for customizing the data model

User-defined objects

User-defined objects (UDOs) are objects that contain customer-specified data and customer-supplied associations. UDOs can be linked or associated with other NX objects including other UDOs, and are kept up-to-date as the associated NX object changes. UDOs enable third-party vendors and users to augment their part files with customer-specific application data.

Availability and packaging

Customization of data and associations in user-defined objects is included in the NX Open Toolkits Author software package.