

# ThingWorx Foundation

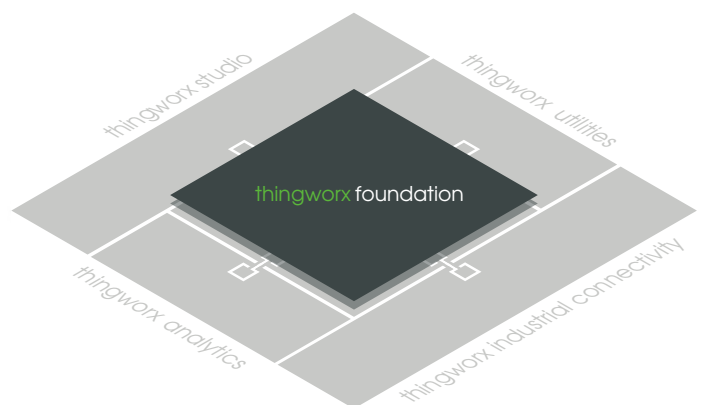
ENABLING THE CREATION OF BREAKTHROUGH APPLICATIONS, SOLUTIONS, AND EXPERIENCES FOR THE SMART, CONNECTED WORLD

The explosion of the Internet of Things (IoT) has created an unprecedented demand for smart, connected products. With the unlimited potential of the burgeoning IoT in their sights, developers are clamoring for the best tools and technologies to create innovative solutions that harness the power of the smart, connected world.

The Internet of Things (IoT) is a new world, with unique challenges for developers, enterprises, and end-users alike as they seek to create, deploy, and integrate IoT technologies and solutions. When enterprises make the decision to implement an IoT strategy, they are entering uncharted territory. Conventional development methods and technologies are rendered ineffective, and they must establish a new technology infrastructure. A ready-built IoT platform provides a seamless approach to rapidly create comprehensive, feature-rich IoT solutions and speed time-to-insight – critical to the success of industrial IoT implementations.

## Meet ThingWorx Foundation

ThingWorx Foundation is the nucleus of the ThingWorx platform, enabling the rapid creation of complete solutions for the industrial IoT. It offers the industry's deepest functional capabilities to connect, create, and deploy IoT solutions faster and more easily than ever before. With out-of-the box extensibility and the largest ecosystem of partners, ThingWorx Foundation easily scales to accommodate business growth, enabling enterprises to maximize the return on investment in new technologies.



With ThingWorx Foundation, enterprises and developers easily:

- Create, test, and deploy industrial IoT solutions faster than ever thought possible
- Build more feature-rich solutions in a fraction of the time
- Deploy IoT solutions that are scalable, secure, and meet the needs of the largest of enterprises

## Key Benefits

- Model-driven rapid application design speeds time to market
- The ThingModel abstracts the digital details and enables connection to all other ThingWorx modules for a seamless developer experience
- Flexible connectivity options maximize market opportunity and minimize integration efforts
- Live collaboration sessions enable more effective, context-aware communication among developers and analysts
- Open platform empowers enterprises to maximize existing technology investments

## How It Works

ThingWorx Foundation connects to all ThingWorx components – ThingWorx Analytics, ThingWorx Utilities, ThingWorx Studio, and ThingWorx Industrial Connectivity. This powerful integration a simplified, seamless approach for developers to rapidly create comprehensive, feature-rich IoT solutions and deliver fast time-to-insight critical to the success of industrial IoT implementations.

Also built with security in mind, ThingWorx Foundation leverages PKI infrastructure for certificate validation, and its granular security model enables data isolation and service execution.

ThingWorx Foundation is comprised of the following components:

### Application Enablement Platform

The ThingWorx Foundation includes the Application Enablement Platform (AEP), a design and runtime engine for IoT applications that enables the rapid creations of an infinite number of applications that leverage real-time, bi-directional connectivity to “things” as needed.

#### AEP includes the following:

- **ThingModel:** A digital entity that represents a physical asset, person, organizational element, or work process
- **Next Generation Composer:** An integrated application modeling environment that uses modern browser concepts to improve developer efficiency, including an intuitive user interface and optimized workflows
- **Mashup Builder:** A “drag and drop” solution that allows developers and business users to create interactive applications, dashboards, collaborative workspaces, and mobile interfaces without the need for coding
- **Integration capabilities:** Connection to other systems enables developers to create more feature-rich solutions quickly and easily
- **Anomaly Detection:** configuration of anomaly alerts is accessible in Composer, simplifying the implementation of powerful analytics capabilities

## Connection Services

ThingWorx Foundation connection services, software agents, and toolkits are available to establish connectivity between devices or assets and ThingWorx Foundation via the communication method and hardware best suited for each scenario.

#### Connection Services include the following:

- **Out-of-the-box connectivity** to industrial devices via ThingWorx Industrial Connectivity
- **Connection Servers:** Support connectivity to devices via several methods, including 3rd party device clouds, direct network connections, Open APIs
- **Device Cloud Adapters:** Offer scalable, secure connectivity and native ThingWorx modeling devices connected through device clouds, including Azure, AWS, and GE Predix - enabling enterprises to more fully maximize existing cloud investments
- **Integration Framework Connectors:** Enable users to easily connect to external back-end systems, including SAP, and consume the data seamlessly in ThingWorx
- **Advanced Capabilities:** More sophisticated tools are available, including secure, bi-directional file transfer, application tunneling to a devices, and video streaming.

## Edge

ThingWorx AlwaysOn connectivity, via ThingWorx SDKs and the Edge MicroServer, provides a scalable, secure, and easily deployable communication technology to facilitate continuous bi-directional connectivity between sensors, devices, equipment, and the ThingWorx server – regardless of network architecture.

- **Edge MicroServer:** Prebuilt agent application that can “drop in and run” in a Windows or Linux environment, can run on a gateway, or be directly embedded into a device
- **Edge AlwaysOn SDK:** Software libraries that allow users to create their own custom agent, available in several platforms and programming languages – Java, C, .NET, iOS

## Connecting the ThingWorx Platform

Created in ThingWorx Foundation, the ThingModel is at the crux of the entire ThingWorx Platform, an essential component that connects all of the pieces of the technology stack.

The ThingModel is the digital representation of an actual physical “thing” – made up of entities that contain real-time data on that thing’s properties, services, subscriptions, and events.

The ThingModel enables the rapid creation of an infinite number of IoT solutions that leverage bi-directional connectivity to “things.” It powers the drag-and-drop functionality that eliminates the need for coding and speeds the creation of high quality applications, dashboards, workspaces, and mobile interfaces. .

The ThingModel also automatically generates an API, enabling it to be easily integrated into all ThingWorx platform modules. This creates a seamless transition between applications and ensures consistency and reliability of “thing”-related information across all ThingWorx-powered solutions and integrated applications and technologies.

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