Network Middleware for Distributed Real-Time Applications

NDDS is network middleware that simplifies the development of distributed, real-time applications. NDDS presents application developers with a publish-subscribe model that removes the complexity from one-to-many communications, distributes data quickly and efficiently over standard networks, supports automatic discovery, and provides automatic hot-swap substitution.

Benefits
- Eliminates network programming
- Provides fast, efficient communications for real-time applications over standard Internet Protocols
- Simplifies complex system design

Highlights
- Anonymous communications using field-proven publish-subscribe model
- Low application-to-application latency
- Automatic discovery and reconfiguration
- Easy-to-learn programming interface
- Network interface uses off-the-shelf stacks
- Efficient multicast messaging with optional reliable model
- Open wire protocol supporting extensibility, multi-vendor interoperability and backwards compatibility
- Available for a wide variety of real-time and workstation platforms
- WaveWorks debug, configuration and performance analysis tools

Network Middleware for Real-time Applications

NDDS eliminates network programming.

Network middleware is a thin layer of software that sits on top of a network stack. It replaces complex, lengthy, and error-prone network code with high-level services.

NDDS is network middleware that presents an easy-to-learn publish-subscribe programming interface.

The publish-subscribe model simplifies many-to-many communications. Applications use named topics rather than network addresses to distribute data.

- Publishers simply create a publication and give it a topic name. Then, to send an issue (data) the application just calls a single NDDS function.
- Subscribers simply create a subscription for a topic name and tell NDDS what to do when a new issue arrives.

Every time the publication has a new issue NDDS handles the network I/O, transparently sending each issue from the publisher to all subscribers with a declared interest in that topic.

If you’re writing a distributed, real-time application, NDDS will reduce your development effort and simplify your application design.

Publish-Subscribe for Real-time Applications

NDDS extends the publish-subscribe model to give real-time applications support for determinism and fault tolerance

NDDS lets the programmer set a deadline so real-time threads can take appropriate action if a new issue does not arrive on time.

NDDS lets the programmer set hierarchies to distinguish primary from back up publications. NDDS then transparently substitutes issues from back ups when the primary fails. Redundant networks are similarly supported.

If you are writing distributed applications with strict timing and high-availability requirements, NDDS manages the network interface and complex interactions underlying fault tolerant operation so the application does not have to.

Network middleware is a layer of software that sits on top of the stack and handles all the network I/O chores for the application.
Dynamic Discovery

NDDS is designed for dynamic environments where users add, delete, mix and match applications.

The NDDS publish-subscribe model features automatic discovery and an open protocol that adjusts automatically as applications join and leave the network.
- Publishers and subscribers can be started in any order
- New applications and objects can be added and deleted any time.
- NDDS supports communications between nodes running different versions of the protocol.
- There is no central point of failure; no name server or central database

If you are building systems that must adjust as nodes join and leave the network, NDDS lets you write the application that can automatically adjust to a wide variety of conditions.

Standard Networks

NDDS is designed to let you use standard networks for your real-time applications.

NDDS uses industry-standard UDP for all of its communications. You can use the off-the-shelf stack you received with your operating system.

To optimize bandwidth use, NDDS supports IP multicast. Using this option, just one message is sent to any number of subscribers. In addition, NDDS provides a reliable multicast mode for subscribers that need to receive every issue in the order sent.

In addition to publish-subscribe communications, NDDS has a client-server relationships which supports transparent hot-swap for redundant servers.

NDDS provides a comprehensive range of services that simplify data communications and reduce your programming effort.

Build on Your Favorite Platforms

NDDS lets you select the platforms and processors that suit your real-time and data processing requirement.

Today's distributed systems often require a mix of real-time and workstation platforms. Mixing operating systems and processors can burden the developer with reconciling different programming interfaces and data representations.

NDDS is available for a wide variety of host and target operating systems. The NDDS code is the same across implementations, and NDDS takes care of all of the data-marshalling and de-marshalling so that you don't need to worry about machine-dependent data representation.

The toolkit includes C, C++, and Java language support, code-generation tool, a wide variety of source code programs and performance tests, on-line documentation, and a self-guided tutorial.

Contact RTI for the list of supported development environments and target platforms.

The WaveWorks Product Family

NDDS is the communications engine underlying the WaveWorks product family.

The WaveWorks product line simplifies the development of distributed real-time applications. Along with NDDS, the WaveWorks family includes an expanding set of tools for application and system debugging and monitoring. Two tools are available today:

WaveSurf™: A configuration and analysis tool that finds all of the NDDS objects and organizes them in an easy-to-read explorer style window. The user can display each object’s properties and make changes for real-time adjustments without writing and recompiling code.

WaveScope™: A monitoring and debug tool that captures and graphically displays the changes in selected program variables. Monitoring variables give you the ability to see how your changes impact program performance in real-time.

Don't Stop Here

Go to www.rti.com/waveworks to find out more about NDDS and the WaveWorks tools. This Web page and links provide a variety of useful white papers and WaveWorks product descriptions. Information can be found on such topics as using Ethernet and Internet Protocols for communications between real-time applications, communications standards for real-time applications, and making middleware build versus buy decisions, as well as more WaveWorks product descriptions.

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