Geräteintegration mit FDT®2
Referent und Unternehmen

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M&M Software and FDT

- Member of Working Group Architecture and Specification since 2000
- Member of Working Group Test and Certification
- Member of Working Group Marketing
- Member of Project Group FDT and OPC UA
- First frame application to verify FDT
- First development tool kit for FDT
- Worldwide Training and Consulting
- Attend interoperability test
- Providing FDT Group Support Line in Germany and China
- Development of Test and Certification Tool dtmINSPECTOR
- FDT Container development projects
- DTM development projects
- Development and Maintenance of Frame Common Component
In most automation systems, devices are installed from different vendors with different functions.

All devices have to be
- configured and operated with specific software tools
- integrated into many different systems
Many different software tools with data exchange

Different communication protocols and paths

No system wide data access
The printer driver is used in the same way in different PC software (e.g. office software)

The printer driver contains the configuration, diagnostics, and other functionalities

The printer driver is developed and delivered by the printer manufacturer
Concept of FDT (2)

- **Frame Application** = operating system (DCS, Engineering Tool, …)
- **FDT interface** = integration standard
- **DTM** = device driver
The Frame Application provides:

- Common Environment
- Network Configuration
- Navigation
- User Management
- Device Management
- Database Storage
The DTM

- ...is the driver representing the actual device

- ...is provided by the device manufacturer

- ...is installed on the PC

- ...can be used in any Frame Application

- ...provides the graphical user interface

- ...allows access to all device parameters
DTM Data & Functions

Complete device specific data and functions are available!
DTM Types / Communication

FDT maps existing networks

Frame Application

Ethernet TCP/IP

DCS

Remote I/O

HART Device

Profibus Device

CommDTM

Device DTM

PROFIBUS

Gateway DTM

Device DTM

HART
FDT is manufacturer, system and fieldbus independent

- Concepts enables customers to select the product which fits best to the automation task

- FDT supports all communication protocols

- Also manufacturer specific communication protocols are supported
FDT (Specification) History

- 1998: FDT 0.98
- 1999: FDT 1.0 (ABB – Siemens Cooperation Project (COM / ActiveX interfaces))
- 2000: First Version (COM / ActiveX / XML interfaces)
- 2001: Published by PNO (no changes regarding 1.0)
- 2002: Correction of problems found during development of first products
- 2003: Additional descriptions & clarifications
- 2004: Functional extensions (+ FDT .NET interop. support)
- 2005: Guideline how to develop FDT 1.2.x with .NET
- 2006: FDT (1.2.1) becomes IEC standard
- 2007: Functional extensions + many improvements (.NET interfaces)
- 2008: FDT 1.2.x .NET Addendum
- 2009: FDT 2.0
Motivation behind FDT 2.0

- FDT 1.x is based on Microsoft COM / ActiveX Technology
  - Are still supported, but not developed further
  - Tools have been partially discontinued (Visual Basic)

- Software Technology and Tools have been enhanced rapidly over the last 10 years to cope with an increased set of demanding requirements

- FDT 2.0 makes it possible to take advantage of current and future .NET Technologies
What must FDT 2.0 do?

**Existing Know-How and components can be used in the future**
- Concepts mostly unchanged
- FDT 1.x DTMs backwards compatible with FDT 2.0
- Migration strategies allowed

**Improved interaction between FDT Components:**
- Simpler architecture
- Better Documentation
- Common Components

**Cover all FDT 1.x requirements**
- Openness towards different device types and fieldbusses
- Application scenarios
- DTM operation scope

**New functionalities possible**
- COM / ActiveX Limitation eliminated (e.g. Installation, distributed applications etc.)
- Safety aspects
- Life-Cycle aspects

*With .NET uses a technology that is supported by Windows today and in the future*
Simplified Installation

- With FDT 1.x DTMs are manually installed.

- Two basic problems existed:
  - Finding the correct DTM for a device type or version
  - Installing DTMs on every workstation

- Both problems are solved in FDT 2.0,
- DTM (Setup) provides the necessary information and functions to carry out the installation automatically without the user.
Improvements in FDT 2.0 (2)

Performance

- Loading and Unloading of DTMs has been optimized
  - A DTM does not always have to be fully loaded, but may access parts of its persistent data record instead, depending on the requirement
- Efficient Communication by utilizing .NET data types instead of XML documents
- Simplification of Interfaces / Interaction

Security

- The identity of the Software manufacturer is guaranteed via a "Microsoft Authenticode®" certificate
- In addition, a frame may check whether a given DTM has successfully been certified, i.e. whether it passed FDT Compliance Tests
**Improvements in FDT 2.0 (3)**

**Interoperability**
- Simplification of Interfaces
- Detailed specification where necessary
- *Optimized finite state machines*
- Rules for threads and synchronization
- Development of „Common Components“

**Life Cycle Management**
- Definition of rules and measurements for device exchange and software updates
- Guidelines for supporting future Windows versions
Interoperability - FDT2 Common Components
Interoperability - FDT2 Common Components

Diagram:
- FDT 1.2.x Interfaces
- FDT 1.2.x / FDT 2.0 Adapter
- Transformer
- Frame Application
- DTM Interfaces
- FDT 2.0 Interfaces
Any kind of mixed topology is possible
- Provides reusable implementation of FDT 2 interfaces for DTMs
- Expandable by additional Wizards and Components
- Financed by a consortium of companies
- Maintenance is financed and managed by the consortium
- FDT Group has the ownership of the product
Frame Common Component

- Provides reusable implementation of FDT 2 interfaces for FDT Frames
  - Support of FDT 1.2.x and FDT2

- Developed and Distributed by M&M Software:
  - *fdtCONTAINER component*
  - Maintenance contracts available
  - Escrow Agreement with FDT Group

- A Change Control Board (CCB) will be set up

- Easy update from *fdtCONTAINER component* for FDT 1.2.x
  - Speeds up availability of FDT2 Frames in the market
  - Saves development time and cost
FDT applications

- Frame applications
  - Engineering system
  - Asset Management system
  - Condition Monitoring system
  - SCADA
  - HMI
  - Maintenance tool
  - Stand alone parameterization tool
  - Etc.

- DTMs
  - Device DTM
  - Gateway DTM
  - Communication DTM
  - Simulation DTM
  - Etc.
Development Tools

- Frame application development:
  - *fdtCONTAINER component*

- DTM development:
  - *DTM Development Suite - dtmMANAGER*

- Based on common components!
Frame application development

FDT Custom Application

Standalone Tool

fvtCONTAINER component

application

fvtCONTAINER

OPC
dtmINSPECTOR
Frame Development Tools

- \textit{fdtCONTAINER} component = Frame Common Component

- Runtime to execute DTMs in an application
- Integrates FDT into any system
- Base for custom-made FDT frame application
- Simplifies the maintenance of your application
- Hides FDT specific complexity
- Efficient and cost-effective FDT integration

![Diagram showing Frame Application and DTM components]

Frame Application

Frame Custom Code

Frame Common Component

defCONTAINER Component

DTM Common Component

DTM Custom Code

DTM
DTM Development Tools
dtmMANAGER - Key Features

- dtmMANAGER3 helps FDT developers to create DTMs based on the DTM Common Components
A Visual Studio Wizard generates a skeleton project based on the basic DTM architecture.

The code generation can be influenced by user input (e.g., type of DTM, supported bus protocols).

This code is then the starting point for the specific DTM development.

The generated source code is already a functional DTM which can be added to the Topology of a FDT Frame Application.
DTM Framework libraries

- Reusable components for the DTM development

- Parameter Model
  - Implementation of a flexible data model which supports working copies and persistence
  - Extensible definition of parameters
  - Modeling of dependencies and validation rules

- User Interface components
  - Reusable WPF controls
  - View Model classes for the implementation of a MVVM pattern
  - Data Carriers for interaction between DTM user interface and DTM business logic

- Helper Classes
  - Useful and reusable helpers and convenience functions
  - Includes Field Bus specific classes for main protocols such as HART or PROFIBUS

- Complements the DTM Common Components
  - dtmMANAGER 3 makes full use of the DTM Common Components
  - The dtmMANAGER3 library provides features which are not covered by the DTM Common Components
Visual Studio Integrated Tools

- **Visual Designers**
  - Allow easy modification of data structures such as the DTM and Device Type information

- **Support for Debugging / Deployment**
  - PostBuild Action which creates DTM manifests and deploys the binaries to the correct locations as specified by FDT
  - The DTM can be tested in any FDT Frame Application immediately after the build process
Customer Specific Extensions

- Customer specific library which extends the dtmMANAGER library

- For example, the library could provide a different parameter model which replaces or extends the standard parameter model

- For a customized parameter model the exposure could then be adapted (ui messages, printing, data access, ...)

- For example, specific Visual Studio editors could be provided for complex data structures

- For example, the library could contain WPF styles for a common look & feel of the user interfaces

- However, this depends on the actual customer requirements and needs to be evaluated case by case
Documentation, Support and Workshops

- **Tutorial Document**
  - Explains the basic DTM architecture
  - Explains typical steps such as the integration of a communication driver, creation of additional user interfaces, etc.
  - Information about DTM deployment and setup creation
  - ...

- **Online Help available for customer at the M&M Extranet**
  - How-to articles
  - Known Problems and latest fixes
  - Code snippets and examples

- **E-Mail Support**

- **Workshops and further Software Services**
Welcome to the dtmMANAGER DTM Wizard.

This wizard will create a FDT®2 DTM project. Click **Next** to continue or **Cancel** to exit.
Impressions

M&M Software GmbH dtmMANAGER Wizard
Creates a new FDT®2 DTM project.

**Product Info**

- **Company Name**: <Company Name>
- **Product Name**: DeviceDtm2
- **Device Category**: Device
- **Icon**

**Buttons**

- Back
- Next
- Cancel
- Finish
M&M Software GmbH dtmMANAGER Wizard
Creates a new FDT®2 DTM project.

Available Categories:
- HART BASIC FSK
- HART C8PSK
- HART Rs485
- HART Wireless
- HART FSK
- HART UDP
- HART Infrared

Required Categories:
- HART BASIC FSK

Supported Categories:

Buttons:
- Back
- Next
- Cancel
- Finish
Impressions
Impressions
Impressions
FDT2 Development Tools - Benefits

- Use of common components
- Maintenance ensured
- Easy to use
- Saves time and money
- Support and workshops available
- Approved quality
- Interoperability

- Best time-to-market
- Best quality
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