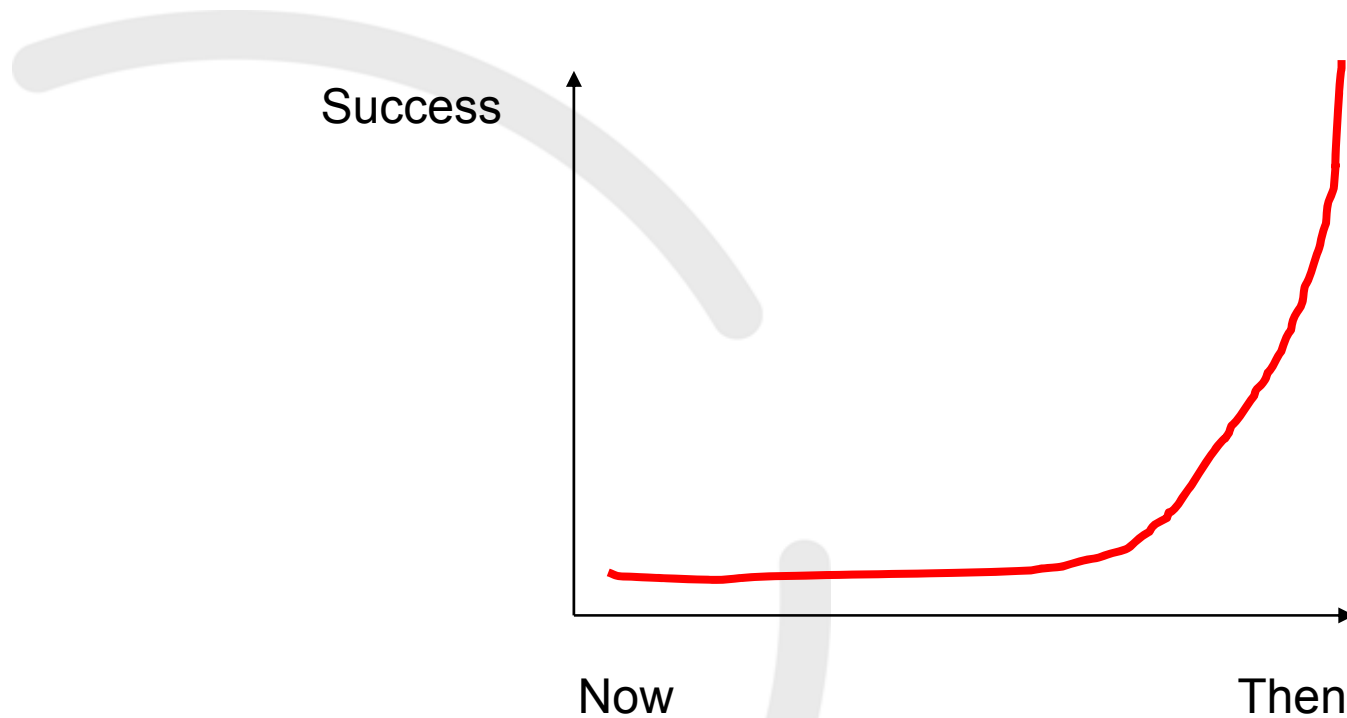




Session ID: CON5106
Enabling Your Device to Be Part of the Internet of Things
Hilton Continental Ballroom 6
10/28/15 11:30 a.m.

Hans Kamutzki
www.microdoc.com
Michael Pernpeintner
www.hepawash.de

IoT – Hockey Stick - Sounds Great ! Right ?



[illegible]

Typical IoT Edge Challenges



■ Hardware Domain

- Lower maturity level
- Less tooling choices
- Higher complexity (BE/LE, HF/SF, Instruction Sets)

■ Software Domain

- Embedded developers face „enterprise“ problems
- Enterprise developers face „embedded“ problems

■ Networking Domain

- Bandwidth and stability
- Security

The HepaWash Challenge

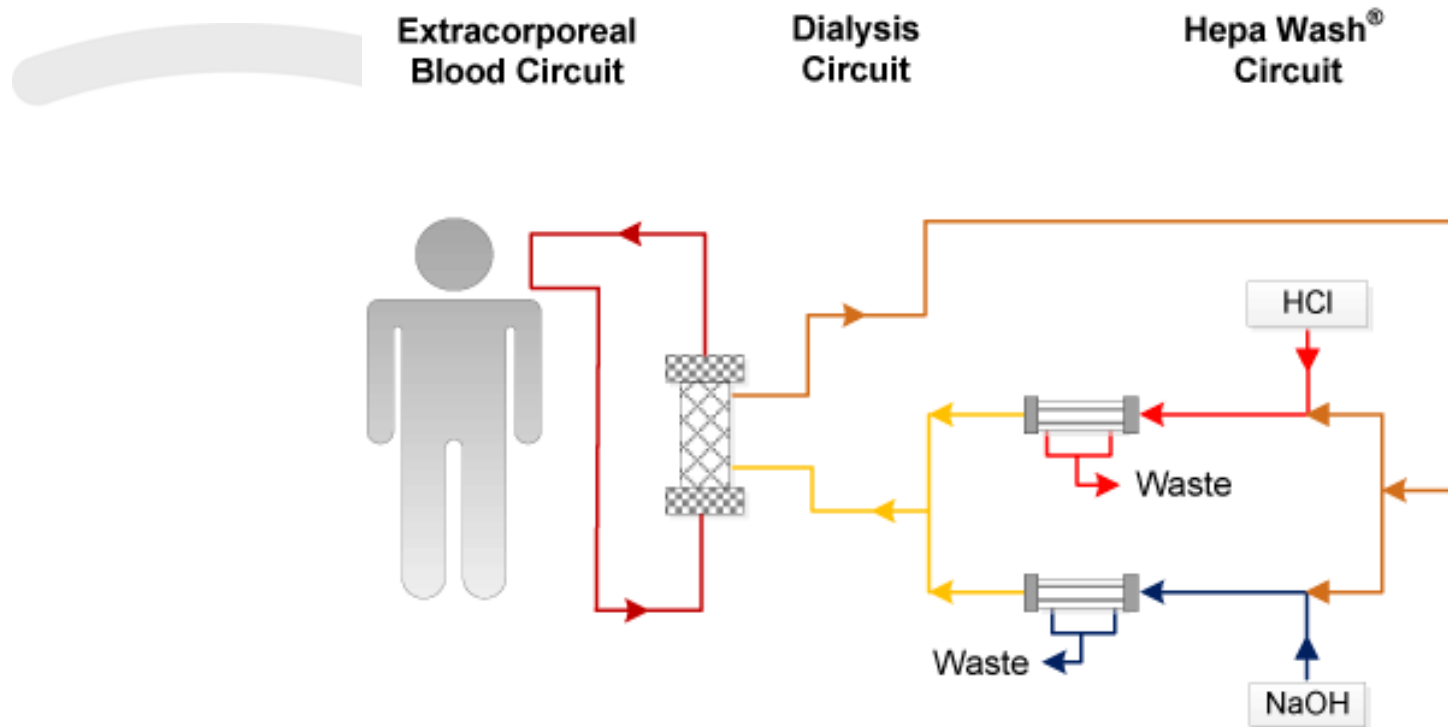


The idea behind HepaWash



- Who has heard about kidney dialysis?
- Who has heard about liver dialysis?
- What are the chances for those patients?
 1. Liver transplantation
 2. Albumin dialysis

The idea behind HepaWash



HepaWash Company Info



- Founded in 2005 by Dr. Kreymann (Nephrologist)
- 2006 first in vitro experiments of the Hepa Wash® therapy
- 2007 first prototype for preclinical studies was develop
- 2009 start of the development and construction of human device prototype
- 2011 Hepa Wash established ISO13485 QM certificate
- 2013 European regulatory market approval



The HepaWash Challenge



2009



2013



HepaWash LK2001 System



The next HepaWash Challenges



2015

■ New requirements regarding:

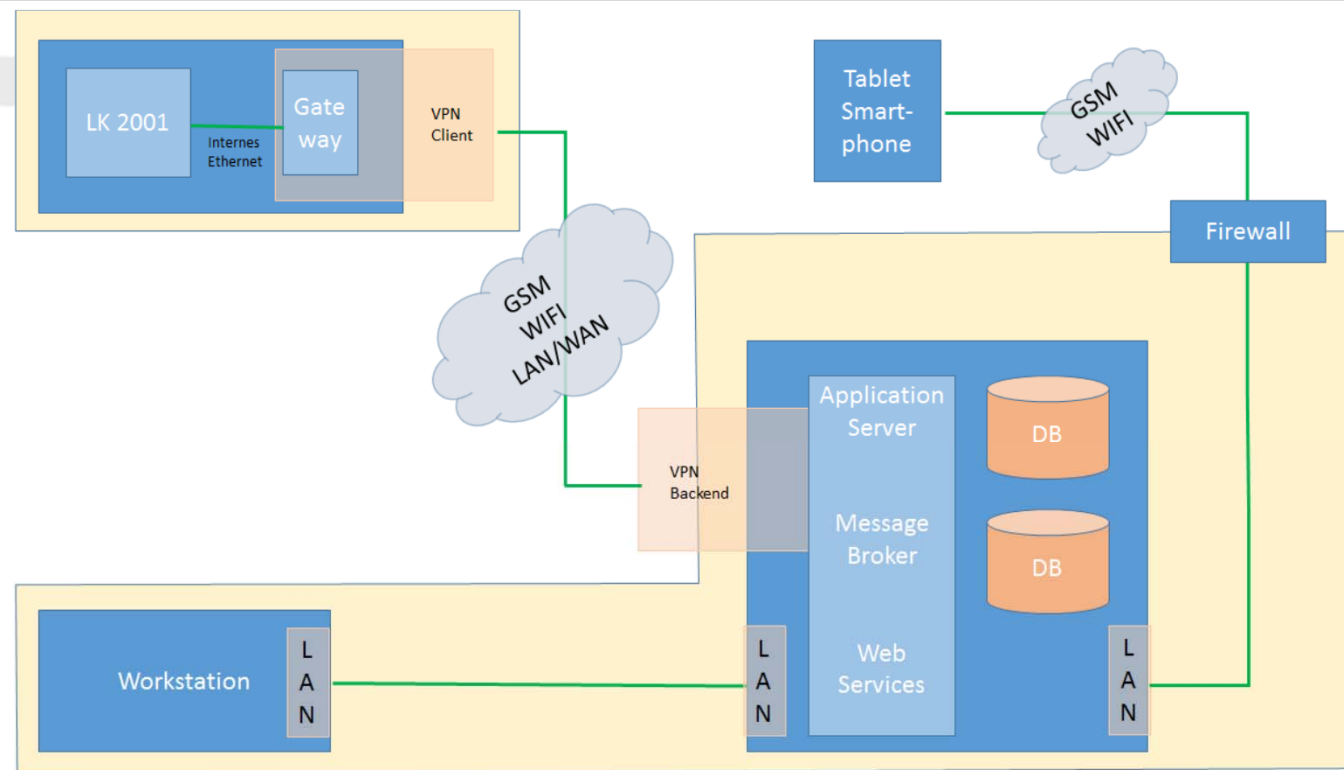
- treatment options
- usability of the devices
- servicing the devices
- linkage to hospital information system (HIS)

HepaWash Functional Requirements



- Automatic Data Transfer
- Online Monitoring
- System Dashboard
- Remote Control
- Remote SW Update
- Remote Training
- Data Analytics
- Predictive Maintenance

HepaWash 4.0 IoT Component Architecture



Questions about realization of IoT



■ What about:

- Reliability
- Security
- Connectivity
- Ease of implementation and maintenance
- Efficiency
- Programming language

Why do You want to use Java for IoT ?



■ What is the essence of IoT ?

- Real world **device** communication
 - D2D and D2S
 - Sending sensor readings and locally processing data
 - Receiving commands, configuration and updates
 - You want a **smart** edge component
 - You want to filter sensor data on demand (100 LK 2001 ~ 30 TByte/Year)
 - You want to preprocess data on the edge
 - You want the ability to configure and add functionality on demand
 - You want remote management

Why do You want to use Java for IoT ?



■ Reliability

- Benefit from a community driven language and platform
 - Open standards vs. proprietary implementations
 - JCP defines Java language and features
- Benefit from extremely well tested and standardized runtime environment
 - JCK makes sure platform performs as expected
- Benefit from a language based on a Virtual Machine
 - Application programs (almost) can't harm system integrity

Why do You want to use Java for IoT ?



■ Security

- Benefit from built in security features
 - Security manager
 - Crypto libraries
 - Access to secure elements
- Benefit from built in update capabilities
 - For application and library patches
- Benefit from wide usage of Java
 - Well observed system, quick fixes

Why do You want to use Java for IoT ?



■ Ease of implementation and maintenance

- Developers of embedded systems traditionally work in a closed environment
 - Connectivity requires them to think differently
 - They face „enterprise IT“ challenges (i.e. handling PKI Infrastructure)
- Java offers a complete set of libraries and tools
 - Advanced Tooling
- Built in deployment and SW update facilities

Why do You want to use Java for IoT ?



■ Efficiency

- Benefit from well established development process
 - Object orientation, agile methods
- Benefit from huge toolsets and OSS components
 - IDEs, runtime libraries
- Benefit from equally huge crowd of skilled developers
 - Reuse of skills form the “enterprise” space
- Benefit from a long term stable platform
 - Platform/Language leveled out between EE,SE and Embedded
- Portability and functional distribution

Java On The Smart Edge Device



■ JavaME

- (Very) small footprint (starts at 128 KB RAM)
- Java 8 language features

■ Java SE Embedded

- Configurable footprint (Compact 1/2/3)
- Powerful JIT compiler

HMI Options



- Headless
- JavaFX
 - Java FX for Embedded
- OpenGL
 - Language bindings („1:1“ call mapping)
- Custom Frameworks
 - HW and system specific runtime libraries

Portability and Plattform Availability



- Multi Vendor Support
 - Open JDK
 - Open source projects and commercial offerings

- Standard Runtimes for IoT (Edge)
 - JavaME 8
 - Java SE Embedded 8

- Custom Runtimes
 - Customization for „closed systems“

Standard Binaries



■ IANAL

■ Download under OTN license for development

- <http://www.oracle.com/technetwork/java/embedded/embedded-se/downloads/index.html>
- <http://www.oracle.com/technetwork/licenses/standard-license-152015.html>

■ ARM Linux, x86 Linux

■ Commercial license BLRA and TML

- Field of use restrictions apply

■ Licensing Model (Embedded VMs)

- Runtime License Model
 - „Pay As You Go“ with quarterly reporting
 - Prepayment
 - Installments
- Price determined by
 - CPU Class
 - Number of cores
- <http://www.oracle.com/us/corporate/pricing/price-lists/java-embedded-price-list-1977272.pdf>

MicroDoc Binaries



- Extended platform offering
 - SE Embedded 8 for MIPS 32 BE Linux
 - SE Embedded 8 for ARM QNX 6.5/6.6
 - SE Embedded 8 for x86 QNX 6.5/6.6*
 - SE Embedded 8 for WinCE 7 ARM
 - SE Embedded 8 for WinCE 2013 ARM
- Customer specific platforms
 - Standard binaries built with customer platform toolchains
- Full platform ports
- JCK tested – fully compliant, MicroDoc License

Support



■ Support Models

- Standard Support
 - Includes option to upgrade to the latest available VM releases
 - Annual support fee based on license volume
- Custom Support Options*
 - Version Lock Licenses
 - No update or upgrade
 - Special arrangements for vital security fixes

*limited availability

■ JavaSE Embedded 8 - Processor Ports

- (1) Zero VM with very little assembly code
- (2) Standard VM without JIT
- (3) JIT support

■ Operating System Ports

- POSIX
- Non-POSIX

Porting Sample



- Handheld computer for retail and logistics application
- Joint effort with Zebra Technologies
- MC3200 Mobile Computer
 - Windows Embedded Compact 7.0
 - Dual Core ARM



Porting Sample



The EnBW EnergyBASE System

I. Transparency, Security & Privacy

- Mini SCADA-System: Performance Monitoring, Device Monitoring & Control
- Security and Privacy
→ **Local** data storage and processing!

Basic-Service



II. Energy Efficiency

- Self-learning intelligent algorithms, forecasts
- Optimization suggestions (user configurable)
- Updates, Backup, Remote access

Optimizer-Service

Thank You !



- Java is the ideal platform for IoT applications
 - Quick start into IoT
 - Long term benefits
- Java based smart edge devices integrate seamlessly with Java middleware and big data analytics
- IoT Cloud Services provide easy access to cloud based backends

References



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