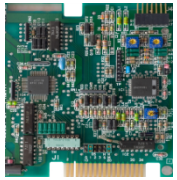
Java and IoT from a MicroDoc perspective



MicroDoc Profile

- Founded in 1991
- Privately owned software engineering company
- Offices in Munich, Berlin, Stuttgart
- International, cross industry, customer base
- Focus on Java Software technology

Some Industries we are working in

- Automotive (Telematics, Headunits)
- Telecom (Networking equipment, Phones)
- Home automation
- Smart Energy
- Looking into industry automation
- Some examples ...

Banksys C-Zam Smash/Xentra

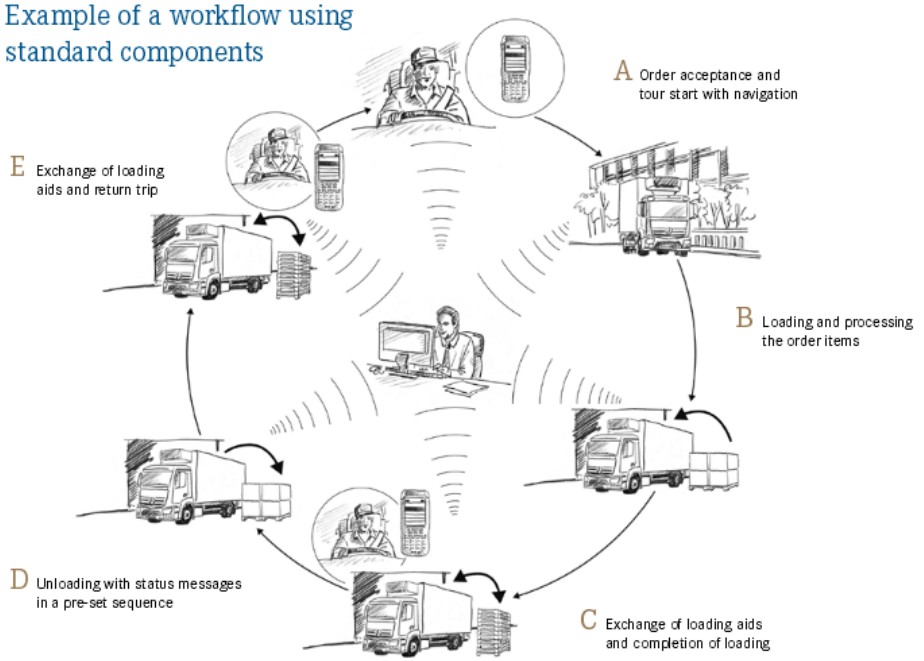
- Payment terminals
- „Smash“ Porting Project
  - VM for x86 and Sun Chorus Operating System
- „Xenta“ Porting Project
  - VM for ARM and RYO Linux (Samoa)
  - First Linux payment terminal on the market

Telit (ex. NXP) ATOP

- Dual processor design,
  - 150MHz, 32MB ARM for Java
- Hardware crypto support
- Various interfaces, like CAN, GSM, GPS
- JVM on „bare metal“
- Greenthreads Implementation
- Implementation of Java VM for headless telematics platform („Smallest OSGi Platform on the Planet“)

Daimler FleetBoard

Innovative Telematics Solutions

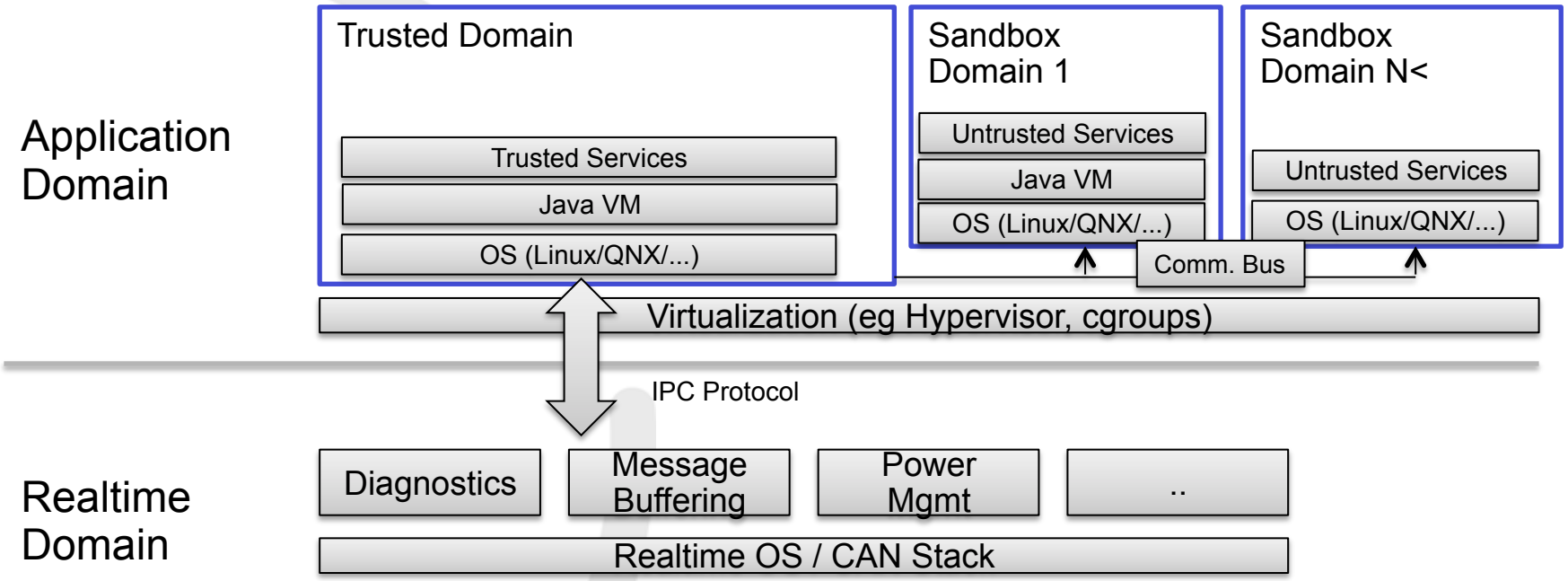


Daimler Fleetboard

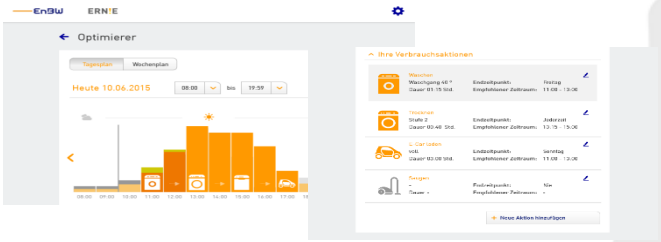
- Telematics & Fleet Management for Commercial Vehicles
  - Mobile Frontends (WinCE, Windows Mobile, Android, iOS etc.)
    - Seamless Integration of Nav System
  - OnBoard Unit (Linux/Headless)
  - Backend Components (Java EE)
- OSGi based architecture
  - „over the air“ SW update & maintenance
  - Support for partial bundle updates
  - OSGi, custom backend system


Contran 245

Telematics Unit Component Architecture



The EnergyBASE



Transparency & Security

- Energy-flow - Monitoring
- Surveillance of equipment (Inverter, Battery,…)
- Local data-mangement

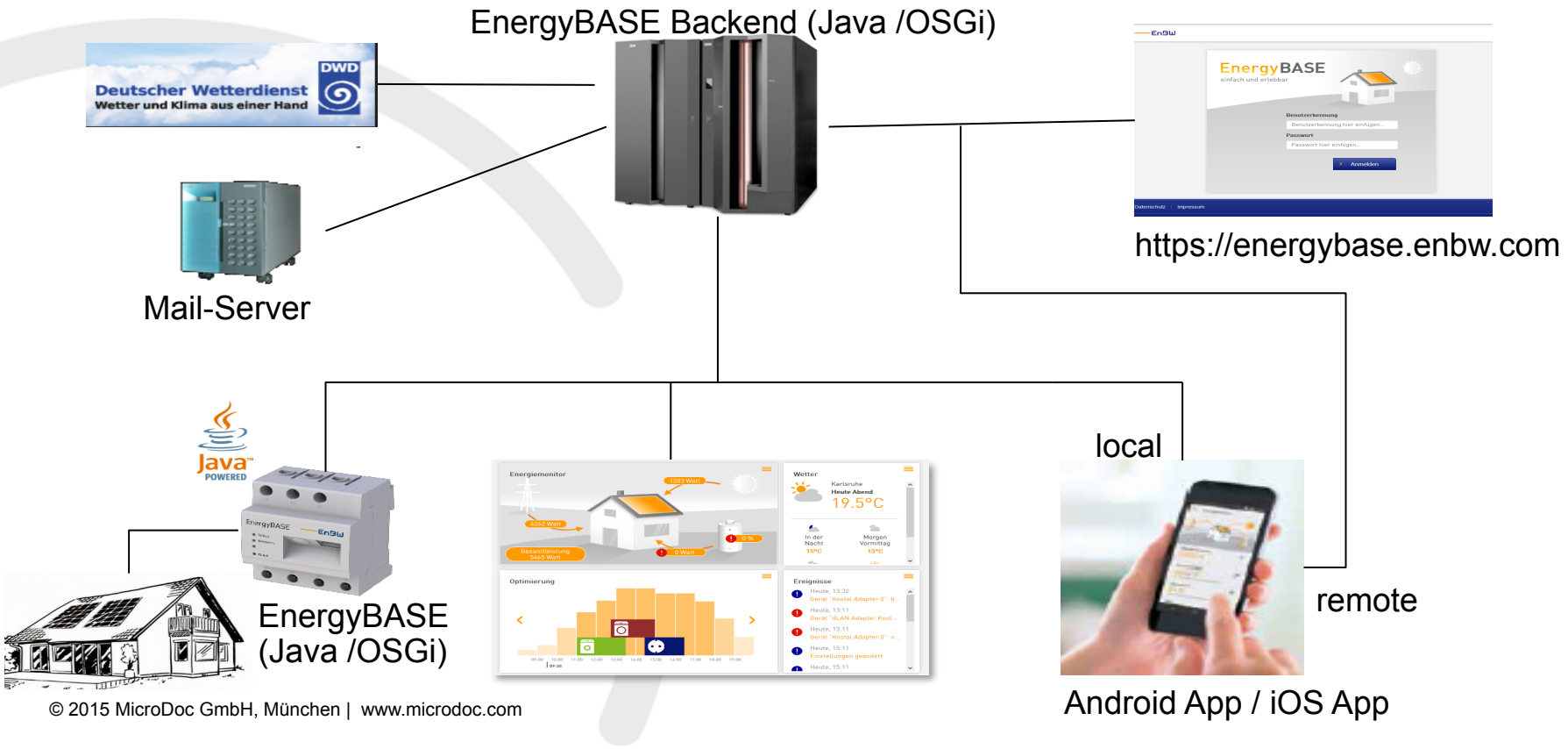
Bascs-Service

Optimisation of private consumption

- Self-learning intelligent algorithms
- Online weather information as well as consumption / generation forecasts
- Optimization suggestions
- Software Updates
- Remote access via web and apps APP(Android & iOS)

Optimizer-Service

System overview EnergyBASE



So, why Java ?

- Of course Robustness, Standards, Security, ….
- Back in the days: Software was a necessary evil when building an embedded product
- Today: Software itself is part of the value proposition and business model
  - “Quick” development but still high quality to avoid expensive field problems
  - Deployed edge devices are considered an asset, where new service can be deployed
  - Over time there will be different platforms in the field that have to be supported – even for one product/service

What has changed over the last years ?

- Fast, ubiquitous, cheap and (sometimes) reliable communication technology drives new business models
  - Telematics, Connected home,
- Embedded hardware (that we target) gets more powerful and cheaper every year (GHz processors, 100s MB of RAM).
  - Hardware designs are getting more and more complex
- Security is becoming very important

Challenges when using Java in this space

- Size – Flash and RAM are always short.
  - Getting „better“ over time
- Startup speed – still a significant problem
  - All kinds of tricks to achieve to required performance
  - Java 9 may improve things.
- JNI access is too slow for some use cases
- GC interruption can interfere with timing critical functions
  - Eg Animations
- Lots and lots of different processors, HW designs, Operating Systems, Tool chains, …
- Heisenbugs due to faulty drivers, buggy JNIs, buggy hardware,etc
- Specific VM versions are typically supported for multiple years

More on Java One

- CON9759
  Energy Revolution: Smart IoT Devices Enable New Business Models for Utilities
- CON5106
  Enabling Your Device to Be Part of the Internet of Things