A novel approach to software development in the microservice environment of vf-OS

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vf-OS platform
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vf-OS

- It is an Open Operating System for Virtual Factories
- Offers a manufacturing oriented cloud platform
- Supports a multi-sided market ecosystem that provides services for the connected factory of the future
- Allows manufacturing companies to develop and integrate better manufacturing and logistics processes

vf-OS is composed of

- Kernel
- Application programming interface
- Middleware specifically designed for the factory of the future
Challenge

Due to the highly distributed microservices architecture used in vf-OS, such an environment poses some challenges for the software development process which will produce the assets
Assets encompass

- Services
- Tools
- Applications

Assets interact with each other through web-technologies

- REST-services
- Web-based GUIs
- Modern message busses
The platform allows the assets to run both InCloud or OnPremise.

Data might be produced within the factories and it can be used within cloud applications.

Security challenges

- To allow the users to control their data dissemination
- Requires security measures to prevent undesired access to machinery and other local resources
An implementation option:

Locally platforms can communicate with a cloud platform through a controlled proxy asset.

The customer application will then run in the cloud platform and only get very controlled access to the data from the factory’s premises.
vf-OS assets

- Standardized structure and packaging format
- The executable entity will be based on Docker images
- Images will be enveloped in a wrapper structure, containing metadata, like access rules, dependency information and security signatures.
- The assets will be storable in the vf-OS Marketplace and can be bought and deployed into the Execution environment, provided by the Platform
Problem
This distributed environment makes it harder to create consistent, coherent applications, especially with regard to debugging, versioning and other software life-cycle aspects.

Goal
An important part of the goals of the vf-OS project is aimed at providing an answer to these challenges.
vApp is the end-user application as an asset.

The vApp development is the most visible asset development process.

But the development of the other assets within the vf-OS environment is very similar.

It is therefore a good approach to use a single development model for both application development and for the development of other assets.
vf-OS Studio

- IDE-like application
- The main assets are Javascript-based services
- Several SDKs and Javascript libraries are provided for interacting with other assets
  - Pub/Sub mechanisms, messaging framework and access to storage facilities
- Each service will run in its own docker container
MarketPlace

The MarketPlace has several tasks in the software development process:

- A marketing and sales channel
- A services registry
- Hosting of the assets for deployment
External services

External services can be represented in the single development model as well, by encapsulating them into vf-OS Assets.

For this purpose the project provides a support module, called the **External Services Provisioning framework**.
The core challenge is software development in such a microservices environment, with the added challenge of security in such a distributed environment.

The solution is to have such an integrated studio, including external services and a proxy model for security.

The novelness lies in the web-based tooling (e.g.: Eclipse CHE) combined with modern containerization (Docker), Microservices and an OS-like middleware for messaging.

Future steps are evaluating this approach, using the projects intermediate releases, use-cases and experimentation. The results of this evaluation will be reported in similar publications.
Questions?

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