

# SKILL/VL

Virtualization of distributed environments for teaching

Research Project in the Department of Computer Science (Fb 2)

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# Project SKILL/VL Team



- **Project Lead:**
  - Prof. Dr. Christian Baun
  - Prof. Dr. Martin Kappes
  
- **Researcher:**
  - Henry-Norbert Cocos
  - Malte Martin Koch
  
- **Special technical Advisor:**
  - Maurizio Petrozziello



- Project *SKILL* (Strategic Competence Platform - Innovative Learning and Teaching)<sup>1</sup> at the Frankfurt University of Applied Sciences [1, 2].
- Digital environment for education.
- Designing a virtual environment for education.
- Organized into 4 subprojects.

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<sup>1</sup>Original: Strategische Kompetenzplattform - Innovativ Lernen und Lehren

# SKILL Subprojects



- **ELLE-Center** – Center for Teaching and Learning (Original: Zentrum für Lehre und Lernen).
- **Case studies** – Social Studies Department (Fb 4) (Original: Fallbeispiele).
- **Design Thinking** and **Data Literacy** - Business Information Systems (Fb 3).
- **Virtualization of distributed environments for teaching** – Computer Science (Fb 2) (Original: Virtualisierung verteilter Umgebungen für die Lehre).

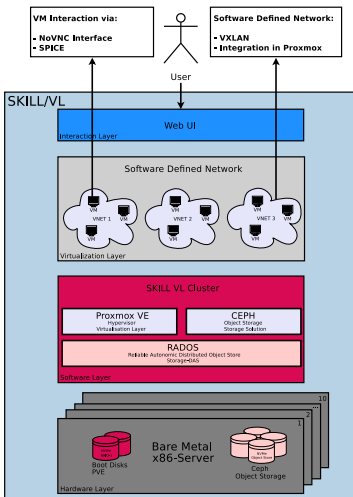
# Virtualization of distributed environments for teaching

## Key features of SKILL/VL platform:

- Hyper converged infrastructure (cluster of 10 servers).
- Software Defined Storage.
- KVM/QEMU as virtualization engine.
- Strict use of open source software.
  - *Proxmox VE* as hypervisor (*KVM-based*).
  - *Ceph* as distributed object storage.
  - *QEMU-Guest Agent* integration for configuration of VMs.
  - *VXLAN* integration for (virtual) network configuration.



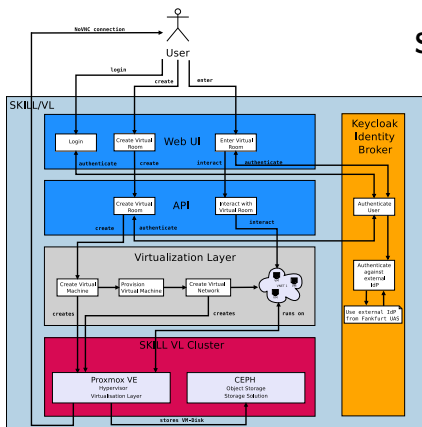
# SKILL/VL Architecture



## SKILL/VL platform:

- **Interaction Layer** – React web UI.
- **Virtualization Layer** – VMs and SDN network environment.
- **Software Layer** – Proxmox VE and Ceph as platform for virtual resources.
- **Hardware Layer** – x86 server, physical network and storage.

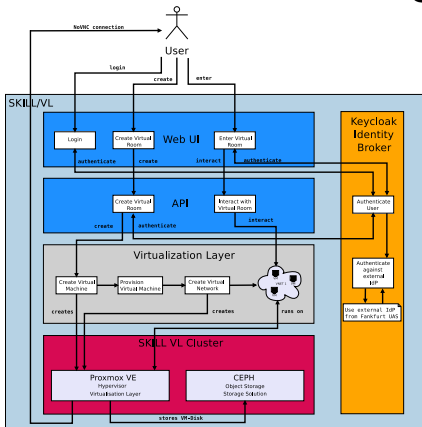
# SKILL/VL internal workflow 1/2



## SKILL/VL workflow:

- **Interaction Layer –**
  - Login to the SKILL/VL platform.
  - User creates virtual room via web UI.
  - User interacts with virtual room via web UI.
- **API –** handles requests from UI.

# SKILL/VL internal workflow 2/2

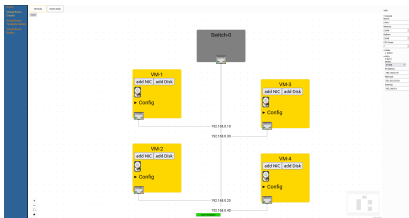


## SKILL/VL workflow:

- **Virtualization Layer –**
  - create and provision virtual machine.
  - create virtual network for VMs.
  - run VMs and virtual network on Proxmox.
- **SKILL/VL Cluster –**
  - creates and runs VMs and networks in Proxmox.
  - stores VM disks in Ceph.



# SKILL/VL – SDDC (Software Defined Data Center)



## SKILL/VL SDDC:

- Creation of complex virtual network scenarios.
- Easy configuration of virtual machines over UI.
- Graphical illustration of complex network topologies.
- Easy to understand without knowledge of infrastructures.

# Thank You For Your Attention!

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- [1] SKILL (Strategische Kompetenzplattform - Innovativ Lernen und Lehren) – Frankfurt UAS. Accessed: July 5, 2023. [Online]. Available: <https://www.frankfurt-university.de/de/hochschule/fachbereich-3-wirtschaft-und-recht/forschung-und-transfer/aktuelle-forschungsprojekte-am-fb-3/skill/>
- [2] Strategische Kompetenzplattform - Innovativ Lernen und Lehren – Stiftung Innovation in der Hochschullehre. Accessed: July 5, 2023. [Online]. Available: <https://stiftung-hochschullehre.de/projekt/skill/>