

Thesis  
B.Sc.

IDP

## Token-based Resource Management - A Currency for Scientific Testbeds

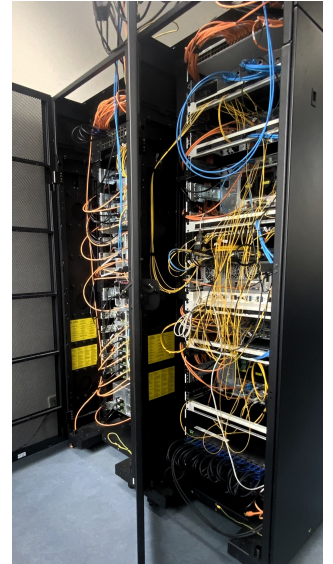
### Motivation

Our chair operates a testbed infrastructure that allows staff and students to perform scientific experiments such as measuring the performance of a networked application in a repeatable way. The testbed consists of several servers and additional hardware such as programmable switches, high-speed programmable NICs, and GPUs. Users with access to the testbed can use a tool developed at the chair called *pos* (*plain orchestration service*) to reserve, allocate, configure, and manage testbed nodes.

As with any system shared by multiple users, undesirable user behavior will occur. Examples include overbooking (booking too many resources), not "freeing" allocated but unused resources, booking servers with features that are not actually needed, etc. Naturally occurring high load situations in the testbed may be made worse by this behavior, and users may not be able to finish their work in time.

To counter this problem, and to allow a more efficient and sustainable operation of our testbed, we want to introduce several new features in *pos* that allow us to control how many resources a user has spent. For this purpose, users obtain a certain quota in form of credits which they spend in the testbed to perform experiments. *pos* must be equipped with a cost function and an indication of how much the current booking will cost. Furthermore, several management functions need to be implemented, that allow us to manage the quota of a user or the inventory of hardware devices we have in the testbed.

With these changes, seemingly unlimited hardware resources are becoming a scarce commodity, encouraging users to use hardware more responsibly. In the long term, these features can also be the basis of fair sharing of testbed resources across Chairs at TUM, or even universities.



### Your Tasks

- Familiarize yourself with *pos*
- Analyze requirements of the planned system
- Design a system that creates the targeted incentives
- Implementation in our testbed

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