GoldenOwl

GOALS

- Assess experimentally the scalability of our blockchain-based, digital solution for the management of education certificates
  - To design an experiment for assessing the scalability of our solution using Grid'5000
  - To package the existing GoldenOwl software stack to easily and quickly deploy instances and execute tests in an automated way
  - To perform scalability tests of GoldenOwl on Grid'5000 and to collect the relevant experimental data;
  - To analyse the experimental data and understand bottlenecks

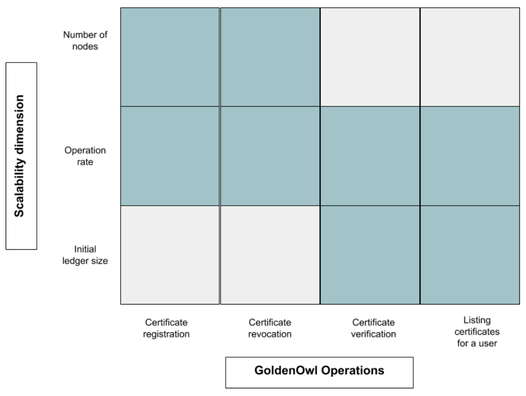
CHALLENGES

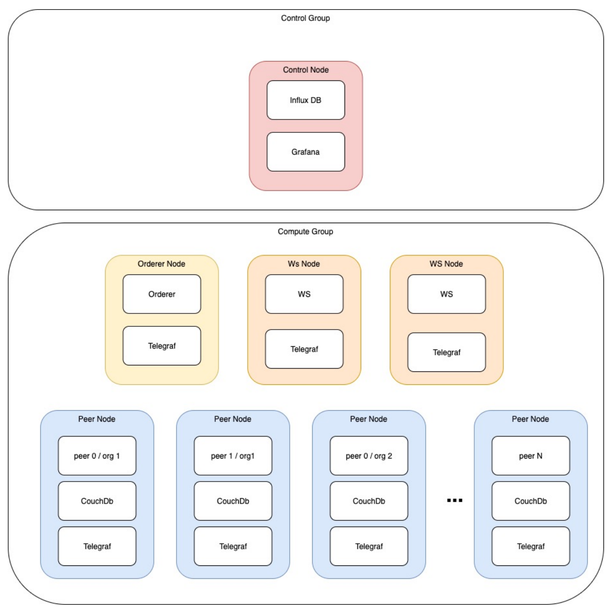
What we need:

- A cloud-in-vitro: realistic yet controlled environment (important for benchmarking)
- Access to large-scale infrastructure: not economically feasible otherwise for the company
- Access to knowledge: documentation & facility expertise
- Set of tools for (partially) automating experiments

DEMO SETUP

- Grid'5000 as experimental facility
- Enoslib & Ansible for experiment automation



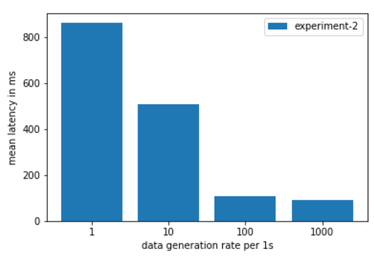


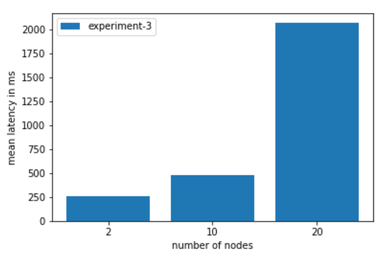
RESULTS

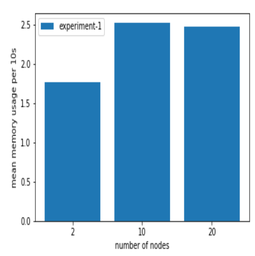
- CPU usage is not influenced by the number of nodes but is influenced by operation per second rate
- The software is not ready to scale to a really high number of nodes
- Network traffic increase with number of nodes – potential bottleneck in terms of unit economics
- Memory usage is stable
- Latency decreases when the operation rate increases
- Latency increases when the number of node increases – superlinear, due to consensus protocol execution time
- The initial ledger size does not influence the latency

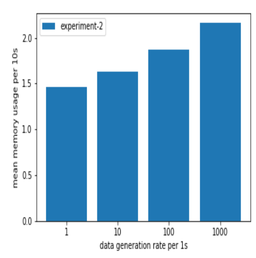
MORE RESULTS

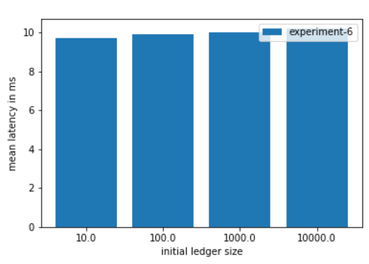
	Experiment-1	Experiment-2	Experiment-3	Experiment-4	Experiment-5	Experiment-6	Experiment-7	Experiment-8
Operation	Certificate Registration	Certificate Registration	Certificate Revocation	Certificate Revocation	Certificate Verification	Certificate Verification	Listing Certificates	Listing Certificates
Number of nodes	2, 10, 20, 50	10	2, 10, 20, 50	10	2	2	2	2
Operation rate per second	100	1, 10, 100, 1000	100	1, 10, 100, 1000	1, 10, 100, 1000	100	1, 10, 100, 1000	100
Initial ledger size	100	100	10000	10000	100	100, 1000, 10000	100	100, 1000, 1000

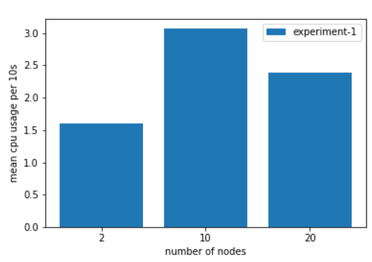


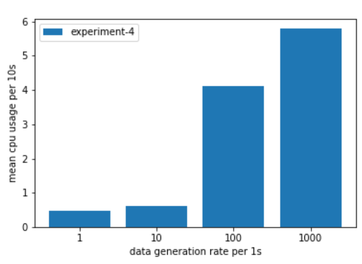


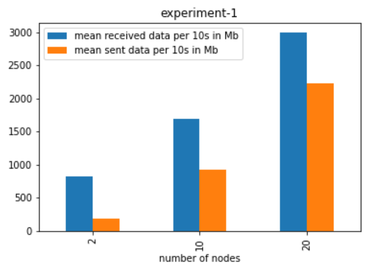


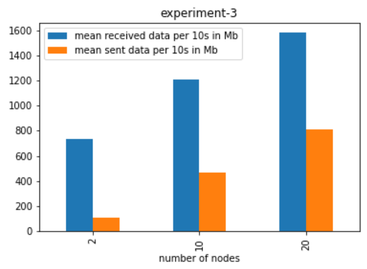












CONCLUSIONS

Main value: identification of the scalability bottlenecks of our current implementation

Other values perceived:

- ability to run experiments in a distributed, large-scale setting
- knowledge of a set of tools for easing/automating deployment and data collection (in particular Enoslib)

POST MORTEM

- Tackle the identified scalability issues → (Technical) product development roadmap
  - 4-5 months of time
  - 10-12PMs of effort estimated
- Do it in an experimentally-driven, agile fashion: quick build/deploy/measure loops
- Will keep on doing it on Fed4FIRE+: GoldenOwl2.0