Open source systems software at the University of Crete and FORTH

Polyvios Pratikakis

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University of Crete - Visual Programming

Implementation of a general-purpose visual programming tool for syntax-directed editing

- Grammar as input, based on the idea of combining interactive syntax learning together with the art of programming as such
- Interactive grammar rules enabling to trace the entire production chain of any source code fragment
- Provision of a custom grammar definition language
- May configure facilities, styling, and also an interactively configurable toolbox of visual program elements
- https://agapakis.github.io/MSC-Visual-Code-Chips
- https://github.com/agapakis/MSC-Visual-Code-Chips

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University of Crete - Open Source Radio

University of Crete Radio Station - All on Open Source Software

1. https://gitlab.com/rastapank/public/-/wikis/home
2. https://github.com/UoC-Radio/JMPXRDS - FM MPX signal generator
3. https://github.com/UoC-Radio/mantato - metadata server based on crossbar.io
4. https://github.com/UoC-Radio/libguard - plugin for picard to gerd against low quality audio

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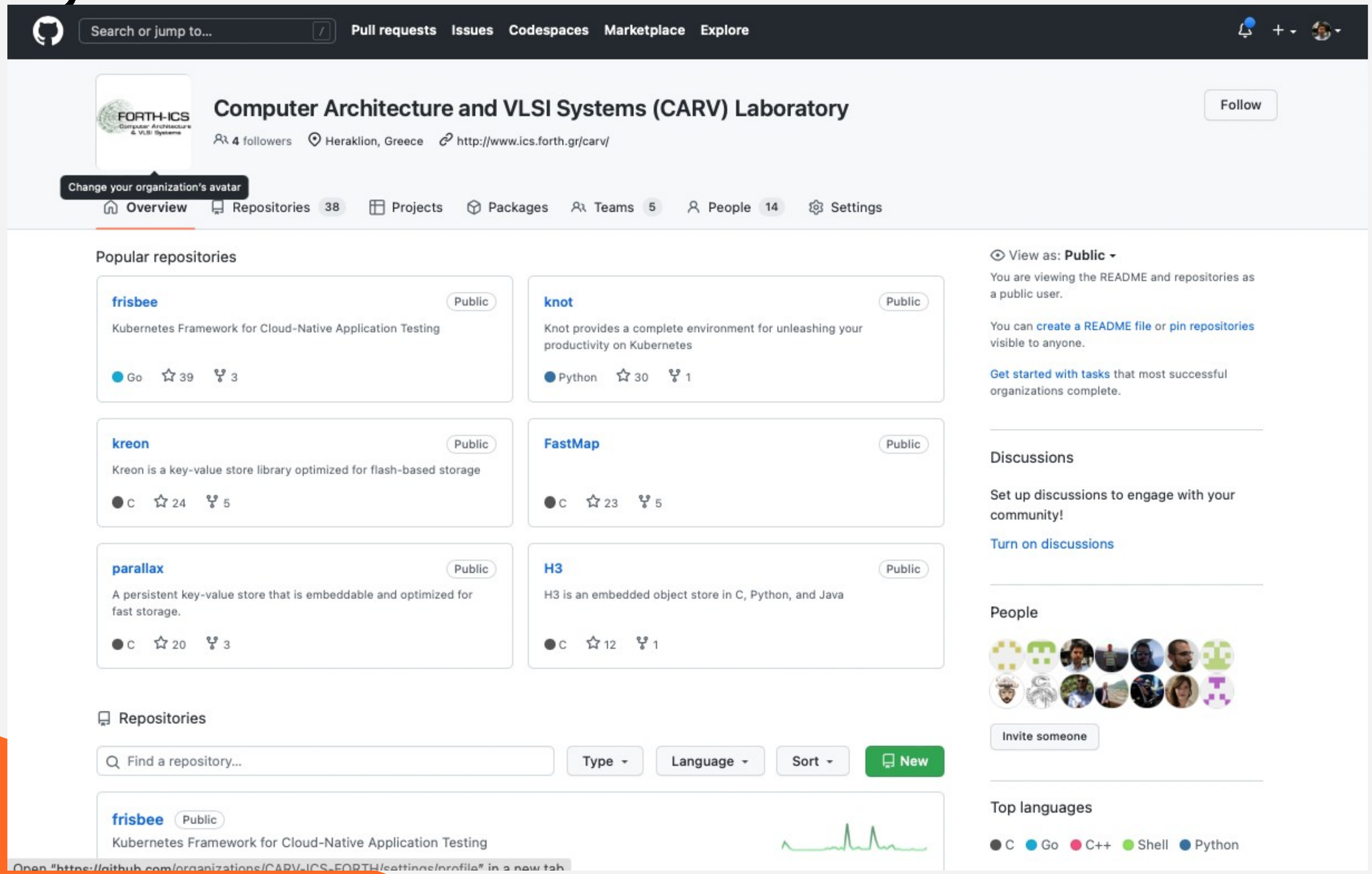
University of Crete - Open Source Radio

5. https://github.com/UoC-Radio/audio-scheduler - Audio Scheduler, automatic DJ
6. https://github.com/UoC-Radio/flow-dashboard - UI for Audio Scheduler
7. https://github.com/UoC-Radio/icestreamer - Encoding and streaming of the final audio stream
8. https://github.com/UoC-Radio/audio-coffin - Recording and Archiving of Radio Shows
9. https://github.com/UoC-Radio/audio-link - Replace audio cables with network traffic

FORTH - Systems Software



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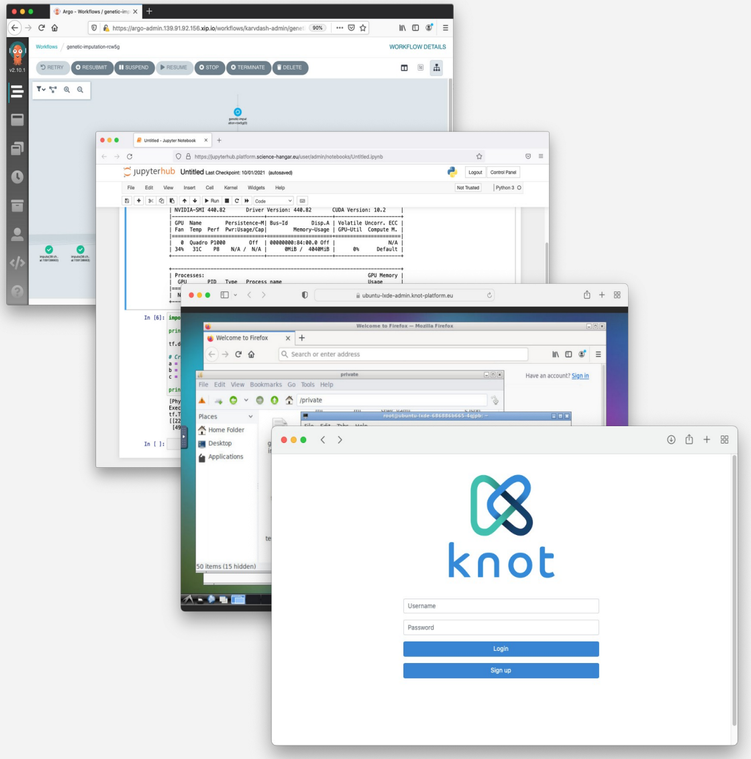
Cloud-native platform for scientific workflows

https://github.com/CARV-ICS-FORTH/knot

- Based on Knot, an in-house, open-source software stack running on Kubernetes
- Includes web-based environment for workflow synthesis and execution
- Notebook frontend
- Focus on reproducibility → Containers and high-level tools
- Easy to use → Familiar web interfaces, transparent file management
- Scale → Local or in the Cloud, exploit accelerators, offload to HPC



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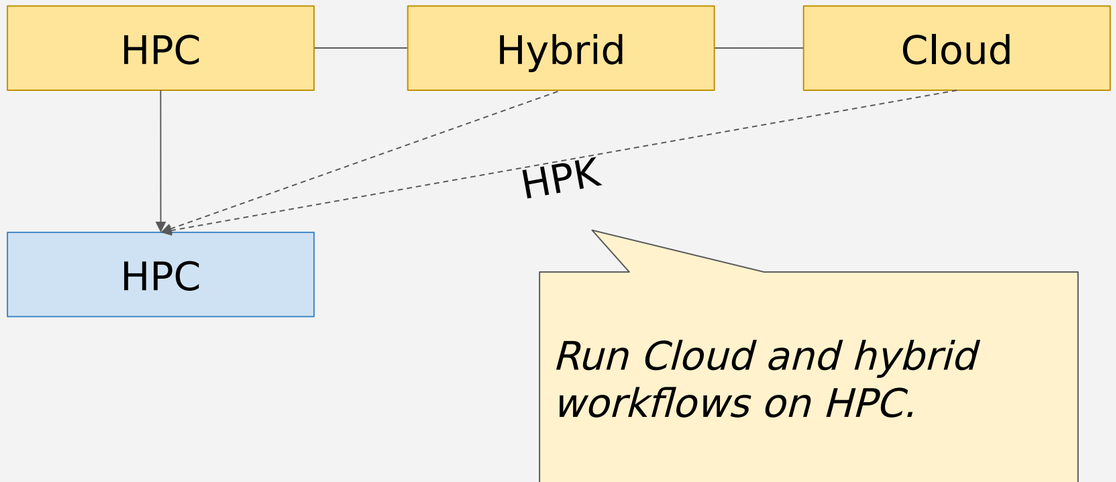
Cloud/HPC convergence

https://github.com/CARV-ICS-FORTH/HPK

- High Performance Kubernetes is the only practical way to run Cloud software in HPC as a user → HPK translates Kubernetes deployments to Slurm scripts
- All Kubernetes abstractions supported
- Resource management delegated to Slurm
- Uses Singularity/Apptainer for running containers
- Also supports running MPI steps as part of Cloud workflows
- Minimal system requirements

HPK

Embed Cloud in HPC



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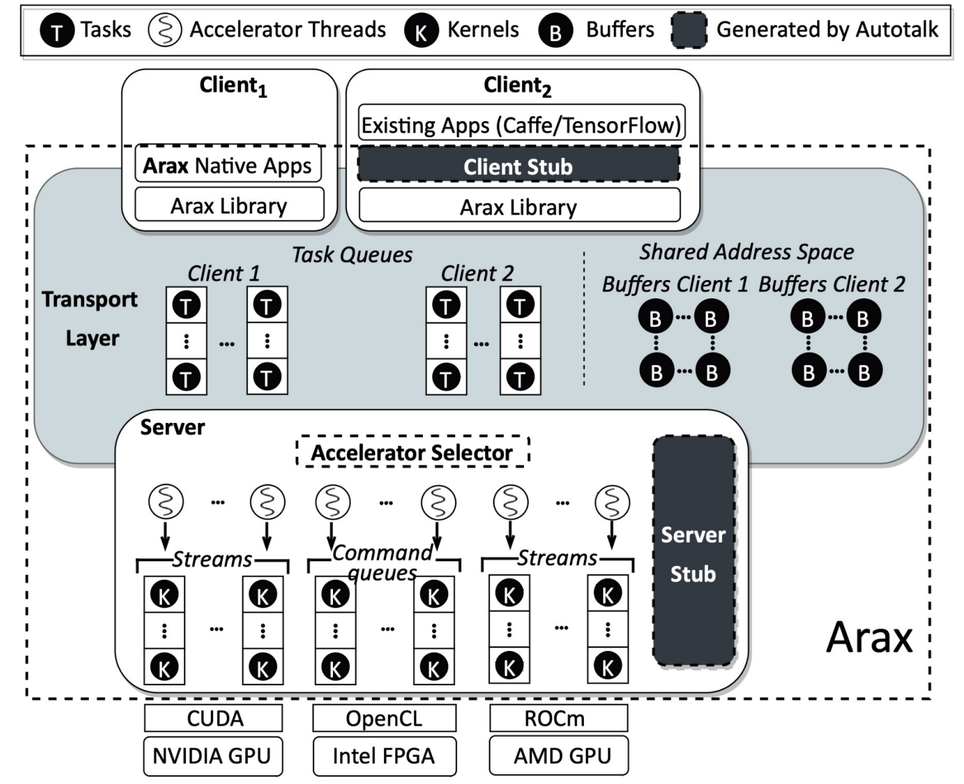
Accelerator management

https://github.com/CARV-ICS-FORTH/arax

- Arax can integrate multiple, heterogeneous accelerators
- Manages available hardware → execution streams, memory
- Handles sharing of resources
- Reduces the programming effort
- Arax also works with CUDA
- GPUs are getting larger, inference workloads smaller fine-grain resource sharing is important



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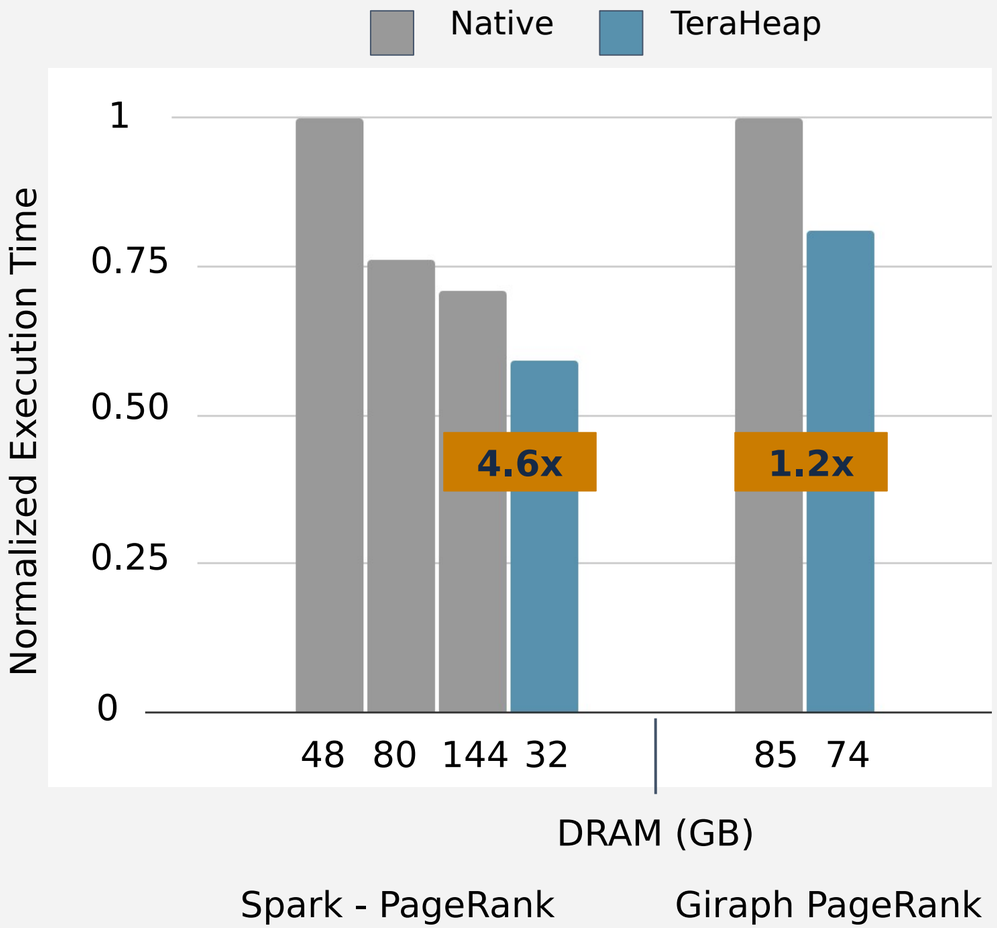
Terabyte Heaps on the JVM

https://github.com/CARV-ICS-FORTH/teraheap

- Data Analytics requires very large heaps
- Garbage Collection Cost is Prohibitive
- Offloading to storage requires serialization/deserialization
- TeraHeap: OpenJDK extension to extend JVM Heap on NVMe devices
- Custom Garbage Collector
- Outperforms native Spark using 4.6x less DRAM
- Outperforms native Giraph using 1.2x less DRAM



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University of Crete and FORTH

1. Thriving Ecosystem
2. Synergies
3. Open Source development and expertise
4. Lots more…

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