Mikhail Surin

Curriculum Vitae

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Experience

2022 – Now **Senior software engineer**, *Yandex*, Moscow.

YDB (is an open-source newsql dbms) query processor team.

Duties

- Development of the query compiler, optimizer and query execution runtime
- 2nd-line support of internal and external users

Achievements:

- Reworked the predicate pushdown logic to make use of calculated (non-literal) read ranges for table reads. As a result allowed users to efficiently use complex filters and allowed to choose secondary indices automatically.
- Reworked query execution model for OLTP pipeline moving the query logic execution from shards pipeline to a separate distributed service which allowed the query processor to pipeline table reads and query logic, to employ resource-based execution planning, improved TPC-C results by 40%.
- Added support for the 'returning' keyword on the internal query language level forcing materialization of computed rows.
- Implemented cpu isolation for user workloads to use in OLAP/HTAP scenarios.

Technologies: C++ 20, actor model, Python, Go

2018 – 2022 **Senior software engineer (got promoted from junior in 2019)**, *Yandex*, Moscow.

yandex base search team.

Duties:

- Development and maintenance of lower levels of search runtime, a search index build pipeline and related infrastructure.
- Capacity planning of lower levels of search runtime.
- Support of ml-engineers from other search departments
- Led a team of 3 developers

Achievements:

- Reworked an inverted index build pipeline which enabled us to extract inverted index to a separate micro-service and save half of the compute resources.
- Designed and developed a low latency network storage for the search index with erasure coding support and strict latency requirements. Further optimized it for bigger throughput enabling the storage runtime to handle over 30k requests/disk reads per second on a single processor core. To improve throughput made use of asynchronous disk APIs. Investigated and successfully mitigated SATA-related issues, linux scheduler latency issues, tuned the networking stack to optimize latency.
- Put search document indices in the network storage which allowed us to to grow the search base by 100% and further reshard enabling us to save 40% of CPU used.
- Designed and developed a control plane for the storage with support for node/data evacuation and load balancing which enabled us to move the storage service to an internal cloud with automatic hosts maintenance and resource allocation. Further generalized it to use as a service in other departments. To improve the scalability of a planning controller designed and developed a reactive framework and to efficiently handle partial persistent state updates and a small ORM for YT objects in C++ to better employ devirtualization and copy elision. This framework improved 15 times reaction time on maintenance/host crashes and data delivery confirmations and allowed us to scale search base.
- Designed and led the generalization of the search storage for use in other departments as a service including a design of control plane. The list of successful integrations includes Yandex internal advertising platform.

Key technologies: C++ 17, MapReduce, Linux AIO, io_uring, Python, Go

2016 – 2018 **Software engineer (got promoted from junior in 2017)**, *Yandex*, Moscow.

news.yandex.com infrastructure team.

Duties

- Development and maintainance of a news scraping robot and document storage.
- Support of ml-engineers
- Second line support of partners (news agencies).

Achievements:

- Reworked the news document annotation service to by asynchronous which enabled the use of large neural models and optimized document annotation time 5 times.
- Developed an external link feature which enabled the service to include links to social nets and comply with regional laws.
- Designed and developed a fault tolerant storage over multiple YT (in-house MapReduce system) clusters surviving drills and data-center outages. This enabled the document base to keep historical data, improved document delivery time by 30%. Also replaced distributed Redis caches, improving resilience.
- Designed and developed a cloud-native scheduler for checking news availability using the new document storage. Implemented reliable checker for historical data availability using OLAP and OLTP capabilities of an in-house MapReduce system (YT) and implemented rate-limiting system to avoid excessive load on partner sites.
- Designed a fault-tolerant stream clustering service instead of legacy non-incremental fresh news clusterization linked to a specific news indexer which enabled us to reduce amount of resources consumed by clustering by 5 times and created consistent clusterization of historical data. Also enabled the service to use persistent story IDs/urls which did not exist before the global clusterization.
- designed and developed a local falut-tolerant document storage for news indexer based on COW balanced trees and write-ahead logging which enabled us to greatly simplify news ranking pipeline by using data snapshots, build consistent data snapshots on historical data and allowed to reproduce exact inputs for ml-models.

Key technologies: C++ 14, Zookeeper, Redis, Lua, MapReduce, event-based architecture

Education

2013–2017 **Bachelor of Computer Science**, *Moscow Institute of Physics and Technology (State University)*, Russia, Dolgoprudny.

Thesis: Jepsen bindings for verification of serializable snapshots

2017–2020 **Master of Computer Science**, *Moscow Institute of Physics and Technology (State University)*, Russia, Dolgoprudny.

Thesis: Data structures for consensus algorithms on persistent memory

2016-2018 **Graduate**, *Yandex School of Data Analysis*, Russia, Moscow.

Awards

2014 IMC – Second prize (107th place)

2014–2015 ACM ICPC Finals – 28th place

Languages

Russian Native speaker

English B2

Spanish B1