CURRICULUM VITAE

Dr. Ramon Antonio Rodriges Zalipynis

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HSE University
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R.A. Rodriges Zalipynis holds a DSc in Computer Science (2024, cum laude), PhD in Technical Sciences (2013), MSc (2008, with Honor) and BSc (2007, with Honor) in Computer Science.

R.A. Rodriges Zalipynis is the author of CHRONOSDB array DBMS[1] presented at VLDB 2018 [1] and SIGMOD 2019 [2], BITFUN at VLDB 2020 [3], a novel R&D direction at SIGMOD 2021 [4], a tutorial at VLDB 2021 [5], WEBARRAYDB & ARRAYGIS [6] and SIMDB [7] at VLDB 2022, FASTMOSAIC [8] at VLDB 2023, CHRONOSSERVER and **CLIMATE WIKIENCE** wikience.org

CHRONOSDB is a distributed, file based, geospatial array (tensor) DBMS[1] that outperforms SCIDB by up to $75\times$ on average: chronosdb.gis.land. CHRONOSDB is always faster and can outperform SCIDB by up to $1034\times$. SCIDB is a distributed array (tensor) DBMS, developed by Paradigm4 and M. Stonebraker, an ACM Turing Award Recipient ("Nobel Prize of Computing").

Ramon Antonio works mainly on **Array (Tensor) DBMSs**[1], with subareas in Distributed Systems, Cloud Computing & HPC, Data-Driven Simulation, Visualization, Ecological Monitoring, Geographic Information Systems, and Big Spatial Data (e.g., Climate & Earth Remote Sensing).

He is a regular reviewer for high-impact journals, an editorial board member (PLOS One), a reviewer board member (MDPI), and a tutorial committee member (VLDB 2023 & 2024).

R.A. Rodriges Zalipynis is the **BEST HSE TEACHER** for 6 years (2017–2021, 2023). **HSE Best Teacher Award** recognizes outstanding teaching achievements in a top-ranked national university ($\mathbf{4}^{\text{th}}$ nationally & $\mathbf{136}^{\text{th}}$ worldwide in Computer Science, $\mathbf{79}^{\text{th}}$ worldwide in Mathematics, $\mathbf{58}^{\text{th}}$ worldwide in Economics according to the QS World University Rankings 2024).

He teaches & advises Doctorate, Master, and Bachelor students. His course list includes Geospatial Data Science, Computer Networks, Geographic Information Systems, Math Modeling & Simulation, Swarm Intelligence, and Spatial Data Management (all developed from scratch by R.A.).

Students have repeatedly and anonymously voted Ramon Antonio's courses as the best in several categories at the same time. For example, "***Best Course for Career Development***", "***Best Course for Broadening Horizons and Diversity of Knowledge and Skills***", and "***Best Course for New Knowledge and Skills***". Please refer to page № 13 for Teaching Experience.

Ramon Antonio is an ACM and IEEE MEMBER: rodriges@acm.org, rodriges@ieee.org

[1] Array (Tensor) DBMSs strive to be the best in managing, processing, and even visualizing **big N-d arrays (tensors)**. It is a young, fast-evolving, and inherently **inter-disciplinary area**: many core data types in geo-, bio-informatics, ecology, medicine, astronomy, climate, to name a few, are naturally modeled by tensors.

R.A. Rodriges Zalipynis. Array (Tensor) DBMS: Theoretical Foundations, Software, and Applications. Doctoral Dissertation (Computer Science), 2024, PDF (58.68 MB, 330 pages, in English ENG), see page № 8

SELECTED PUBLICATIONS

Please, note that R.A Rodriges Zalipynis is the sole author of almost all selected publications. The publications present innovative projects resulted from extensive, world-class R&D.

PVLDB – is an open-access **journal ranked Q1**, see Scimago: **top 15** in Computer Science as of May 2023 (indexed by both Web of Science & Scopus). Each accepted article is offered a presentation slot at the next available VLDB conference: vldb.org/2021

VLDB (International Conference on Very Large Data Bases) – is a premier annual international conference for data management and database researchers, vendors, practitioners, application developers, and users; ranked **CORE A*** (highest) by the CORE rankings.

SIGMOD (ACM Special Interest Group on Management of Data Conference) – is a premier international conference on data management, databases, and data structures (**CORE A***); e.g., B-tree, R-tree, and RAID arrays were presented at SIGMOD, more details: https://2021.sigmod.org

1. **R.A. Rodriges Zalipynis**. ChronosDB: Distributed, File Based, Geospatial Array DBMS. ***PVLDB***, 11(10): 1247–1261, 2018. DOI · PDF · **Article, Q1 Journal**

   CHRONOSDB outperforms SCIDB by up to **75×** on average. **CHRONOSDB** is always faster and can outperform SCIDB by up to **1034×** **CHRONOSDB** is a cloud-native DBMS. SCIDB is developed by Paradigm4 and M. Stonebraker, an ACM Turing Award Recipient ("Nobel Prize of Computing").

   Homepage: http://chronosdb.gis.land
   Details: see page № 34

2. **R.A. Rodriges Zalipynis**. ChronosDB in Action: Manage, Process, and Visualize Big Geospatial Arrays in the Cloud. ***SIGMOD*** 2019, P. 1985–1988. DOI · **CORE A***

   A new distributed WMTS server directly inside **CHRONOSDB** and **new** components enabling users to interact with **CHRONOSDB** and appreciate its benefits: (1) Web GUI, (2) execution plan explainer (investigate the generated DAG), and (3) dataset visualizer (display CHRONOSDB arrays on an interactive Web map).

3. **R.A. Rodriges Zalipynis**. BitFun: Fast Answers to Queries with Tunable Functions in Geospatial Array DBMS. ***PVLDB***, 13(12): 2909–2912, 2020. DOI · PDF · **Article, Q1 Journal**

   A new class of Array (Tensor) DBMS queries is identified & tackled: tunable queries. **BITFUN** provides novel strategies to continuously re-index arrays (tensors) to efficiently answer queries with similar mathematical functions. It can be up to **8×** faster than computing the results from scratch.

   Homepage: http://bitfun.gis.land
   Video: https://youtu.be/uxGuZU8yEvE (7 min.)
   Details: see page № 38

4. **R.A. Rodriges Zalipynis**. Convergence of Array DBMS and Cellular Automata: A Road Traffic Simulation Case. ***SIGMOD*** 2021, P. 2399–2403 · **open access** · DOI · **CORE A***

   A novel Research & Development direction in the domain of Array (Tensor) DBMS is presented. For first time, we enabled Array (Tensor) DBMS to simulate the physical world. The approach brings powerful parallelization, data fusion, array processing, and interoperability to name a few. As an example, ChronosDB simulates a complex road traffic model with multiple lanes, road intersections, and traffic lights.

   Homepage: http://sigmod2021.gis.gg/
   Video: https://youtu.be/3g1m1fNL6P4 (8 min.)
   Details: see page № 40

   Video 20 min.: https://dl.acm.org/doi/10.1145/3448016.3458457

5. **R.A. Rodriges Zalipynis**. Array DBMS: Past, Present, and (Near) Future. ***PVLDB***, 14(12): 3186–3189, 2021. DOI · PDF · **Tutorial at VLDB 2021** · **Article, Q1 Journal**

   The **first** comprehensive tutorial on Array (Tensor) DBMS **R&D**. Presents numerous promising **R&D** opportunities.

   Tutorial duration: 90 *minutes* (1.5 *hours*). *The Tutorial is included in the main conference program, main conference day.*
   Only 8 tutorials were accepted to VLDB 2021: accepted tutorials

   Homepage: http://vldb2021.gis.gg/
   Details: see page № 31

   The homepage provides high-quality videos of the tutorial (1.5 hours)

6. **R.A. Rodriges Zalipynis**, N. Terlych. WebArrayDB: A Geospatial Array DBMS in Your Web Browser. ***PVLDB***, 15(12): 3622–3625, 2022. DOI · PDF · **Article, Q1 Journal**

   The **first** Array (Tensor) DBMS that can run completely inside a Web browser: **WebArrayDB**. The article also presents **ArrayGIS**, a new Web GIS based on **WebArrayDB**. The systems can be over **2×** faster compared to querying only Sentinel-Hub, a Cloud service for disseminating Sentinel data (recently acquired by Planet).

   Homepage: https://wikience.github.io/webdb2022
   Video: https://youtu.be/NnpNR8GArj0 (5 min.)
   Details: see page № 39

Try ArrayGIS and WebArrayDB for free: http://webdb.gis.gg

7. **R.A. Rodriges Zalipynis**. SimDB in Action: Road Traffic Simulations Completely Inside Array DBMS. ***PVLDB***, 15(12): 3742–3745, 2022. DOI · PDF · **Article, Q1 Journal**

   The **first** Array (Tensor) DBMS running end-to-end physical simulations completely inside itself: from data preparation to simulation to computing statistics.

   Tensor DBMSs can bring numerous benefits to simulations via a "DBMS approach", e.g., powerful parallelization and interoperability, while simulations expand the Tensor DBMS landscape and open a wide range of R&D opportunities.

   Homepage: https://wikience.github.io/simdb2022
   Video: https://youtu.be/NnpNR8GArj0 (5 min.)
   Details: see page № 40

8. **R.A. Rodriges Zalipynis**. FastMosaic in Action: A New Mosaic Operator for Array DBMSs. ***PVLDB***, 16(12): 3938–3941, 2023. DOI · PDF · **Article, Q1 Journal**

   FASTMOSAIC is a new Array (Tensor) DBMS mosaic operator, equipped with our new, more scalable way to perform Canonical Correlation Analysis (CCA) in linear time, constant memory capacity, and derive CCA canonical variables together with mosaic transformation coefficients in the same pass over the input data.
   The novel CCA algorithm is **orders of magnitude faster** for the purpose of tensor mosaicking compared to the popular Python scikit-learn

   CCA is a popular tool for finding correlations in multidimensional datasets. CCA is widely used in Data Science for dimensionality reduction and discovering latent variables.

   Homepage: https://wikience.github.io/fastmosaic2023
   Video: https://youtu.be/DXC4r5DCd6k (15 min.)
   Details: see page № 41

9. **R.A. Rodriges Zalipynis**. Quantum Tensor DBMS and Quantum Gantt Charts: Towards Exponentially Faster Earth Data Engineering. ***Earth***, 5(3): 491–547, 2024. DOI · **open access** · **Article, Q2 Journal**

   We propose new types of charts: Quantum Gantt (QGantt) Charts and Quantum Network Diagrams (QND). In addition, we present a new quantum Array (Tensor) DBMS data model and new quantum approaches to demonstrate exponential speedups when applied to many toughest Array (Tensor) DBMS challenges stipulated by classical computing and real-world use-cases.

Educational Publications

1. **R.A. Rodriges Zalipynis**. Spatial Data Management [Electronic Resource] = Spatial Data Management: Course Syllabus (Curriculum). – Text electronic edition (3.3 MB). – St. Petersburg: Naukoemkie Technologii, 2023. – 30 P. PDF
   ISBN 978-5-907804-14-2 · **Details**: see page № 54
   - Governmental Registration (16 JAN 2024) № 0322400007
   - Publisher's Page: id 812
   - E-Library: id 59085393

2. **R.A. Rodriges Zalipynis**. Computer Networks [Electronic Resource] = Computer Networks: Course Syllabus (Curriculum). – Text electronic edition (0.9 MB). – St. Petersburg: Naukoemkie Technologii, 2024. – 32 P. PDF
   ISBN 978-5-907804-23-4 · **Details**: see page № 58
   - Governmental Registration (30 JAN 2024) № 0322400190
   - Publisher's Page: id 821
   - E-Library: id 59908291

Doctoral Dissertation

R.A. Rodriges Zalipynis (Ramon Antonio Rodriges Zalipynis)

Array (Tensor) DBMS: Theoretical Foundations, Software, and Applications. Doctoral Dissertation (Computer Science), 2024, PDF (58.68 MB, 330 pages, in English ENG), see page № 8

Additional Multidisciplinary Publications

For publications with students, please refer to page № 22

R. A. Rodriges Zalipynis (2011) **ChronosServer: real-time access to "native" multi-terabyte retrospective data warehouse by thousands of concurrent clients**. *Informatics, Cybernetics, and Computer Engineering*, 14 (188): 151–161. PDF (*As part of Ramon Antonio's PhD*)

R. Newberry, A. Lupo, A. Jensen, R. A. Rodriges Zalipynis (2016) **An Analysis of the Spring-to-Summer Transition in the West Central Plains for Application to Long Range Forecasting**, ***Atmospheric and Climate Science***, No. 6, P. 375–393, 2016. DOI

R. A. Rodriges Zalipynis (2019) **Evaluating Array DBMS Compression Techniques for Big Environmental Datasets**, *Proceedings of the 2019 IEEE 10th International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, P. 859–863. ***IEEE***, 2019. DOI

R. A. Rodriges Zalipynis (2021) **Towards Machine Learning in Distributed Array DBMS: Networking Considerations**, *Machine Learning for Networking: Third International Conference*, MLN 2020, Paris, France, November 24–26, 2020, Revised Selected Papers, Lecture Notes in Computer Science (***LNCS***), P. 284–304, Springer, 2021. DOI

R. A. Rodriges Zalipynis (2018) **Generic Distributed In Situ Aggregation for Earth Remote Sensing Imagery**, *Proceedings of Analysis of Images, Social Networks and Texts – 7th International Conference*, AIST 2018, July 5–7, 2018, Revised Selected Papers. Lecture Notes in Computer Science (***LNCS***), Vol. 11179, P. 331–342, Berlin: Springer, 2018. DOI

R. A. Rodriges Zalipynis (2018) **Distributed In Situ Processing of Big Raster Data in the Cloud**, *Perspectives of System Informatics – 11th International Andrei P. Ershov Informatics Conference*, PSI 2017, June 27–29, 2017, Revised Selected Papers, Lecture Notes in Computer Science (***LNCS***), Vol. 10742, P. 337–351, Springer, 2018. DOI

R. A. Rodriges Zalipynis (2017) **Array DBMS in Environmental Science: Sea Surface Height Data in the Cloud**, *Proceedings of the 2017 IEEE 9th International Conference on Intelligent Data Acquisition and Advanced Computing Systems: Technology and Applications (IDAACS)*, P. 1062–1065, ***IEEE***, 2017. DOI

R. A. Rodriges Zalipynis (2016) **ChronosServer: Fast In Situ Processing of Large Multidimensional Arrays with Command Line Tools**, *Supercomputing. RuSCDays 2016.* Revised Selected Papers. Communications in Computer and Information Science (***CCIS***). Vol. 687, P. 27–40, Springer, 2016. DOI

R. A. Rodriges Zalipynis (2016) **In-situ processing of big raster data with command line tools**, *Proceedings of the international Conference "Russian Supercomputing Days 2016"*, Moscow State Lomonosov University, P. 20–25, 2016.

Research & Professional Experience

2015 – present **Associate Professor**
School of Software Engineering
Faculty of Computer Science
HSE University

2014 – 2015 **Senior Researcher**
Belgorod National Research University

2013 – 2014 **Associate Professor**
Department of Computer Systems for Monitoring
Faculty of Computer Science and Technology
Donetsk National Technical University, Ukraine

2009 – 2013 **Assistant Lecturer**
Department of Computer Systems for Monitoring
Faculty of Computer Science and Technology
Donetsk National Technical University, Ukraine

Selected Awards

The awards have resulted from highly selective competitions.

Best Teacher of HSE University:

2017 2018 2019 2020 2021 2023

Other achievements:

2023 **Gratitude** from the School of Software Engineering, Faculty of Computer Science, HSE
2011 **Best Scientist** of Donetsk National Technical University (the 95th Solemn Anniversary)
2005 **Certificate of Honor** from the Donetsk National Technical University for **"Excellence in academic progress and active research"**

Ramon Antonio is the Best HSE Teacher for 6 years (2017–2023). *HSE Best Teacher Award* recognizes outstanding teaching achievements and is a highly selective competition with active student participation: www.hse.ru/en/best

For example, HSE University employed about "**7000** instructors and researchers", but only "**478** staff members were recognized as best teachers" (**less than 7%**) in 2020: link

HSE University is ranked (QS World University Rankings 2024):

★ **4th** nationally (136 worldwide) in "Computer Science"
★ **79th** and **72nd** worldwide in "Mathematics" and "Social Sciences and Management"
★ **58th** worldwide in "Economics"

HSE University has consistently taken top places at the ICPC World Finals: **world finalist** (1st place, 2023: https://icpc.global/worldfinals/scoreboard/2023/scoreboards/47/index.html), **gold medals** (3rd place, 2022: https://icpc.global/worldfinals/scoreboard/2023/scoreboards/46/index.html), **bronze medals** (9th place in 2021, 10th, 11th, 12th places in other years)

Hence, **HSE Best Teacher Award** testifies excellence in teaching.

EDUCATION & TRAINING

2024 **D.Sc.** **COMPUTER SCIENCE, cum laude**
DOCTOR OF SCIENCE IN COMPUTER SCIENCE
HIGHER DOCTORATE
HSE University, Moscow

2013 **Ph.D.** **TECHNICAL SCIENCES**
Donetsk National University &
Ministry of Education and Science of Ukraine

2008 **M.Sc.** **SOFTWARE FOR AUTOMATED SYSTEMS, with Honor**
The total percentage of 'Excellent' marks is 100%
Donetsk National Technical University, Ukraine

2007 **B.Sc.** **COMPUTER SCIENCE, with Honor**
The total percentage of 'Excellent' marks is 93%
Donetsk National Technical University, Ukraine

D.SC. DISSERTATION

Topic: Array (Tensor) DBMS: Theoretical Foundations, Software, and Applications.

Dissertation: https://www.hse.ru/data/xf/939/321/2122/rodriges_diss.pdf (PDF, 58.68 MB, 330 pages, in English [ENG]). Dissertation Page: https://www.hse.ru/sci/diss/924193473

Dissertation Committee: S. Kuznetsov (HSE University), Q. Liu (University of Missouri), A. Legalov (HSE University), B. Mirkin (Birkbeck University of London; HSE University), I. Oseledets (AIRI: Artificial Intelligence Research Institute, Director; Skoltech, Professor).

See Selected Publications (page № 2) and Selected Projects (page № 9): CHRONOSDB, BITFUN, WEBARRAYDB, ARRAYGIS, SIMDB, and FASTMOSAIC.

PH.D. DISSERTATION

Topic: Ecological monitoring subsystems for accessing Earth remote sensing data, their visualization and analysis.

The Ph.D. dissertation was devoted to innovative methods and techniques for accessing **large volumes of Climate & Earth** remote sensing data, their analysis, and visualization. A grant from U.S. Civilian Research and Development Foundation (CRDF) № UKM1-2973-DO-09 ($\approx 77,000$ USD, 2011–13) partially supported his efforts in the development of **CHRONOSSERVER**© and **CLIMATE WIKIENCE**© (see section "Selected Projects").

M.S. DISSERTATION

Topic: Methods for solving graph partitioning problems using a cluster computer network.

The M.S. dissertation proposed a new multilevel graph partitioning algorithm implemented using C++ and MPI (Message Passing Interface) for High-Performance Computing (HPC). It achieves up to 44% of improvement in partitioning cost for some graphs compared to multilevel algorithms of METIS – one of the best graph partitioning software.

Please, have a look at the M.S. poster on page № 32 (in English) and M.S. page (in English).

SELECTED PROJECTS

CHRONOSDB

Innovative array/tensor DBMS. It is **always faster than SCIDB**: **by up to 75× on avg and max 1034×** SCIDB is developed by Paradigm4 and M. Stonebraker, an ACM Turing Award Recipient ("Nobel Prize of Computing")

CHRONOSDB provides processing, transformation, and visualization operations similar to GDAL, ImageMagick, CDO, NCO, GIS, and other tools, but for **Geospatial Grids** that are big, require rapid analysis, or generated at a high rate, e.g. **Climate** and **Earth remote sensing data**. As these data are crucial for vital daily tasks like urban planning, agriculture monitoring, forestry control, and rapid-response in disaster management, to name a few, **CHRONOSDB** can significantly facilitate solving many practically important and commercially attractive tasks.

Web: http://chronosdb.gis.land/
Details: see page № 34

Presented at **VLDB 2018** [1] and **SIGMOD 2019** [2]

CLIMATE WIKIENCE

A **novel software ecosystem** to store, access, visualize, and analyze large volumes of Climate and Earth remote sensing data.
The ecosystem pioneered the field and remains innovative. Unlike Google Earth Engine (2012), Amazon Earth (2013), Forest Watch 2.0 (2014), Dask (2015), Climate Engine (2017), Earth Blox (2021), and Microsoft Planetary Computer (2021), **CLIMATE WIKIENCE** is a desktop software: it has a rich user interface and a wide range of powerful capabilities inherent to desktop software. Whereas related systems mostly rely on Google infrastructure, CHRONOSSERVER can be deployed in a private Cloud with a modest budget.
Web: wikience.org
Video (2 min.): YouTube
Brochure: PDF
Details: see page № 35
Interface: see page № 36

CHRONOSSERVER

Distributed, high performance array/tensor data dissemination server for thousands of concurrent clients

Web: http://www.wikience.org/chronosserver/

Paper: ***R.A. Rodriges Zalipynis***. *ChronosServer: real-time access to "native" multi-terabyte retrospective data warehouse by thousands of concurrent clients. Inf., Cyb. and Comp. Eng.*, 14(188):151–161, 2011 PDF

Details: see page № 37

BITFUN

Re-computes tunable math functions on tensors **up to 8× faster**.

Web: http://bitfun.gis.land

BITFUN tackles an important class of queries not explicitly considered before in the context of array (tensor) DBMS: tunable queries. BITFUN explicitly focuses on the fact of tunability.

Presented at **VLDB 2020** [3]
Details: see page № 38

WEBARRAYDB

The 1^{st} array (tensor) DBMS running completely inside a Web browser.

WEBARRAYDB supports data ingestion over the WMTS protocol, provides a storage engine, SQL-like query syntax, and executes local map algebra operations directly in a Web browser. For locally stored tensors, WEBARRAYDB enables ARRAYGIS to adjust color palettes, get source array cell values under the mouse cursor, and run tensor computations completely in a Web browser. Besides the latency reduction for improved user experience, other important benefits include client hardware utilization (e.g., GPU via WebGL) and reduced server load (potentially more clients with less cost).

Presented at **VLDB 2022** [6].
Details: see page № 39

ARRAYGIS

A novel Web GIS based on WEBARRAYDB

ARRAYGIS, based on WEBARRAYDB, can be **over 2× faster** compared to querying only Sentinel-Hub, a popular Cloud service.

ARRAYGIS is freely accessible at: http://webdb.gis.gg

Presented at **VLDB 2022** [6].

Details: see page № 39

SIMDB

The 1^{st} array (tensor) DBMS running end-to-end physical simulations completely inside itself: from data preparation to simulation to computing statistics.

For example, SIMDB can simulate vehicle movement on multiple lanes with road intersections controlled by traffic lights. Vehicles have different lengths, moving directions, varying speed, can change lanes, directions, and overtake each other.

The **novel R&D direction** and novel application of array (tensor) DBMSs: physical world simulation were presented at **SIGMOD 2021** [4] and **VLDB 2022** [7]

Web: http://sigmod2021.gis.gg

Details: see page № 40

FASTMOSAIC

A novel operator for Array (Tensor) DBMSs.

We introduced a new, scalable way to perform Canonical Correlation Analysis (CCA) that is **orders of magnitude faster** than the popular Python's scikit-learn library for the purpose of array (tensor) mosaicking.

Web: wikience.github.io/fastmosaic2023

Details: see page № 41

Presented at **VLDB 2023** [8].

SELECTED GRANTS

1. **Winner**, Course "Geospatial Data Science", language ENG, syllabus development was supported by the Fund for Educational Innovation, HSE University, 1 K USD, 2022; see HSE link and page № 13
   - "Geospatial Data Science" course syllabus © Ramon Antonio Rodriges Zalipynis, 2022
2. **Winner**, Course "Mathematical Modeling and Simulation", language ENG, syllabus development was supported by the Fund for Educational Innovation, HSE University, 1 K USD, 2022; see HSE link and page № 13
   - "Mathematical Modeling and Simulation" course syllabus © Ramon Antonio Rodriges Zalipynis, 2022
3. **Winner**, Course "Spatial Data Management", language ENG, syllabus development was supported by the Fund for Educational Innovation, HSE University, 1 K USD, 2022; see HSE link and page № 13
   - "Spatial Data Management" course syllabus © Ramon Antonio Rodriges Zalipynis, 2022
4. **Group Leader**, Geoinformatics Group at the Faculty of Computer Science, HSE University, 1 M RUB (approx. 16 K USD), 12/2018–12/2020. Group page: https://cs.hse.ru/geo/

   Results of group members (https://cs.hse.ru/geo/persons):
   - E. Gerasimenko: **Winner (2020: 3rd place, HSE news), Laureate (2021: HSE news)**
     A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
     Obtained B.S. (2022) under the supervision of Ramon Antonio
   - N. Terlych: co-authored papers at **FTC 2020** and **VLDB 2022**, page № 22
     Obtained B.S. (2020) and M.S. (2022) under the supervision of Ramon Antonio
     Started his career as a Lecturer at HSE University, Faculty of Computer Science: HSE Homepage
     Currently a PhD student under the supervision of Ramon Antonio
5. **Winner**, Course "Computer Networks", language ENG, syllabus development was supported by the Fund for Educational Innovation, HSE University, 1 K USD, 2019; see HSE link and page № 13
   - "Computer Networks" course syllabus © Ramon Antonio Rodriges Zalipynis, 2019
6. **Researcher**, Non-stationarity and fractality of dynamics in the evolution of complex systems: applications to physics of the Earth and the Sun, Russian Science Foundation (RSF), Grant №17-11-01052, 18 M RUB (approx. 277 K USD), 05/2017–12/2019.
   Project publications: Page № 2
7. **Winner**, Course "Geoapplications Development", language ENG, syllabus development was supported by the Fund for Educational Innovation, HSE University, 1 K USD, 2016; see HSE link and cs.hse.ru/dse/rgeo
   - "Geoapplications Development" course syllabus © Ramon Antonio Rodriges Zalipynis, 2016
8. **P.I.**, Developing new distributed methods for processing large volumes of raster data, Russian Foundation for Basic Research (RFBR), Grant №16-37-00416, 900 000 RUB (approx. 15 000 USD), 01/2016–12/2017.
   Project publications: Page № 2
9. **Expert**. Analysis and community monitoring of surface water quality in Lugansk region, Small Grants Program of GEF in Ukraine www.sgp.undp.org/, 49 743 USD, 2013–2014, grant issued for NGO "Donets". Project page on the UNDP portal.

   Book (as one of the project results, in Ukrainian):

G. Averin, **R.A. Rodriges Zalipynis**, V. Kliuiev, *Rivers of Lugansk Region*, Lugansk, Shiko, 2014. ISBN: 978-966-492-564-5 Full Text on ResearchGate and wikience.org

10. **Chief executive & Architect** (+ fully developed the grant application), Discovery of synoptic patterns of climate variability and change using data mining and high performance computing, U.S. Civilian Research and Development Foundation (CRDF), Grant № UKM1-2973-DO-09, 76 780 USD, 02/2011–05/2013.

    ★ Partially supported **CLIMATE WIKIENCE** and **CHRONOSSERVER** as part of Dr. Zalipynis Ph.D. Page № 9

11. **Analyst**. Development of Eco-Monitoring Program of Lugansk Oblast, Lugansk Regional Government, 300 000 UAH (approx. 60 000 USD), 02/2010–12/2010.
12. **Researcher & Developer**. Automated Complex for Meteorological Observations and Environmental Pollution Control, Donetsk Regional Government, 500 000 UAH (approx. 100 000 USD), 01/2008–12/2009.
13. **Developer**. Database of Budget Organizations for Energy Consumption of Donetsk City, Donetsk Regional Government, 650 000 UAH (approx. 130 000 USD), 06/2007–12/2009.
14. **Researcher & Developer**. Environment Monitoring System for Donetsk Region, Donetsk Regional Government, 500 000 UAH (approx. 100 000 USD), 12/2007–12/2008.

PROJECTS WITHOUT FUNDING

Service for Mapping Ice Conditions of the Northern Sea Route, 2023 (included SAR data analysis)

Joinlty with T. Aslyamov from greenatom.ru, an IT-integrator of the State Atomic Energy Corporation Rosatom (ROSATOM)

K. Mikhailova defended her BSc work in Software Engineering based on the results of this project.

TEACHING EXPERIENCE

The courses are being / were taught at the Faculty of Computer Science unless otherwise stated.

Faculty of Computer Science (figures as of December 2022, cs.hse.ru/en/about):

3 669 students **490** staff **15** degree programmes **13** labs **1** doctoral school

Roles of Ramon Antonio:

SYLLABUS	developing syllabus	LECTURES	giving lectures
TEACHART	developing teaching materials	HOMEWORKS	developing & checking homeworks
SEMINARS	conducting seminars	EXAM	examining students

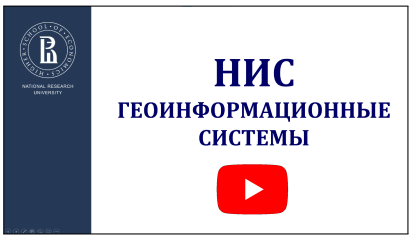
Language: ENG or RUS – a course taught in English or Russian, respectively.

Many courses are the best in several categories according to the anonymous votes of students.

Course video-presentations

youtu.be/CEU8hLDVJjI

youtu.be/8VJFCkQQKFU



youtu.be/GN-wgl_rhWo

Educational Publications

1. **R.A. Rodriges Zalipynis**. Spatial Data Management [Electronic Resource] = Spatial Data Management: Course Syllabus (Curriculum). – Text electronic edition (3.3 MB). – St. Petersburg: Naukoemkie Technologii, 2023. – 30 P. PDF · **ISBN** 978-5-907804-14-2 · **Details**: see page № 54
2. **R.A. Rodriges Zalipynis**. Computer Networks [Electronic Resource] = Computer Networks: Course Syllabus (Curriculum). – Text electronic edition (0.9 MB). – St. Petersburg: Naukoemkie Technologii, 2024. – 32 P. PDF · **ISBN** 978-5-907804-23-4 · **Details**: see page № 58

Note

URLs (links) to courses older than 5 years may not work

COURSES 2024/2025

Master's program Data Science

- Geospatial Data Science (1 year, 1, 2 module; 23 students enrolled, 35%) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  One of the largest elective courses by the number of students in 2024/2025
  Foreign students constitute 83% of the group
  6 ECTS credits **228** total hours **44** contact hours (22 lectures, 22 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once:
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

Bachelor's program Software engineering (ABET-accredited till 01 Oct 2022)

- Mathematical Modeling and Simulation (4 year, 1–3 module; 21 students enrolled) ENG
  ⇄ inter-{campus, faculty} course: 7 students from another campuses & faculties took the course
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  10 ECTS credits **380** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.
  The course is running

- Spatial Data Management (3 year, 1, 2 module; 10 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **56** contact hours (28 lectures, 28 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.
  ★ **Please, refer to a recent educational publication [1]**

  Students voted for the course as the best in 2 categories at once:
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

- Computer Networks (3 year, 3, 4 module; 24 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.
  ★ **Please, refer to a recent educational publication [2]**

  The course is running

- Research Seminar "Swarm Intelligence Algorithms" (4 year, 1–3 module; 17 students) RUS
  ⇄ inter-{campus, faculty} course: 8 students from another campuses & faculties took the course
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **48** contact hours (48 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  The course is running

COURSES 2023/2024

Master's program Data Science

- Geospatial Data Science (1 year, 1, 2 module; 20 students enrolled, 33%) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  One of the largest elective courses by the number of students in 2023/2024
  Foreign students constitute 70% of the group
  6 ECTS credits **228** total hours **44** contact hours (22 lectures, 22 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once (see page № 42):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

Bachelor's program Software engineering (ABET-accredited till 01 Oct 2022)

- Mathematical Modeling and Simulation (4 year, 1–3 module; 25 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  10 ECTS credits **380** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.
  Students voted for the course as the best in the following category (see page № 53):
  ★ Category 'Best Course for New Knowledge and Skills'

- Spatial Data Management (3 year, 1, 2 module; 12 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **56** contact hours (28 lectures, 28 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.
  ★ **Please, refer to a recent educational publication [1]**

  Students voted for the course as the best in 2 categories at once (see page № 52):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 26 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **44** contact hours (44 seminars)
  Ramon Antonio developed this course from scratch in 2017 and is continuously improving it.

- Computer Networks (3 year, 3, 4 module; 29 students enrolled) ENG
  ⇄ inter-campus course: 2 students from 2 another campuses took the course
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.
  ★ **Please, refer to a recent educational publication [2]**

- Research Seminar "Swarm Intelligence Algorithms" (4 year, 1–3 module; 26 students) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **48** contact hours (48 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.

COURSES 2022/2023

Master's program Data Science

- Geospatial Data Science (1 year, 1, 2 module; 26 students enrolled, 43%) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  One of the largest elective courses by the number of students in 2022/2023
  Foreign students constitute about 40% of the group
  6 ECTS credits **228** total hours **40** contact hours (20 lectures, 20 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once (see page № 43):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

Bachelor's program Software engineering (ABET-accredited till 01 Oct 2022)

- Mathematical Modeling and Simulation (4 year, 1–3 module; 33 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  10 ECTS credits **380** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.

- Spatial Data Management (3 year, 1, 2 module; 10 students enrolled) ENG
  ⇄ inter-campus course: 2 students from another campus took the course
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 30 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **44** contact hours (44 seminars)
  Ramon Antonio developed this course from scratch in 2017 and is continuously improving it.
  Students voted for the course as the best in the following category (see page № 51):
  ★ Category 'Best Course for New Knowledge and Skills'

- Computer Networks (3 year, 3, 4 module; 29 students enrolled) ENG
  ⇄ inter-campus course: 1 student from another campus took the course
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  5 ECTS credits **190** total hours **60** contact hours (30 lectures, 30 seminars)
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.

- Research Seminar "Digital Imaging" (2 year, 1–3 module; 12 students) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **44** contact hours (44 seminars)
  Ramon Antonio developed this course from scratch in 2022 and is continuously improving it.

- Research Seminar "Swarm Intelligence Algorithms" (4 year, 1–3 module; 21 students) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  3 ECTS credits **114** total hours **44** contact hours (44 seminars)
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.

COURSES 2021/2022

Master's program Data Science

- Geospatial Data Science (1 year, 1, 2 module; 37 students enrolled, 49%) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  The largest elective course by the number of students in 2021/2022
  Foreign students constitute about 40% of the group
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once (see page № 44):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

Bachelor's program Software engineering (ABET-accredited)

- Computer Networks (3 year, 3, 4 module; 16 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.
  Students voted for the course as the best in all possible categories at once (see page № 50):
  ★ Category 'Best Course for Career Development'
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 30 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2017 and is continuously improving it.
  Students voted for the course as the best in the following category (see page № 47):
  ★ Category 'Best Course for New Knowledge and Skills'

- Research Seminar "Swarm Intelligence Algorithms" (4 year, 1–3 module; 30 students) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2021 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once (see page № 49):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

COURSES 2020/2021

- Algorithms and Data Structures (2 year, 1–4 module, approx. 300 students enrolled) RUS
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  In addition, Ramon Antonio coordinated 13 teaching and 3 seminar assistants.
  Weekly: 2 lectures and 18 seminars.
  Home tasks were assigned each 1-2 weeks, each for approx. 300 students.
  Ramon Antonio developed this course from scratch in 2020 and is continuously improving it.

- Computer Networks (3 year, 3, 4 module; 15 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.
  Students voted for the course as the best in all possible categories at once (see page № 45):
  ★ Category 'Best Course for Career Development'
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 17 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2017, reworked in 2020
  Students voted for the course as the best in 2 categories at once (see page № 48):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

COURSES 2019/2020

- Algorithms and Data Structures (2 year, 1–4 module, approx. 150 students enrolled) RUS
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  In addition, Ramon Antonio coordinated 4 teaching and 1 seminar assistant.
  Weekly: 1 lecture and 9 seminars.
  Home tasks were assigned each 1-2 weeks, each for approx. 150 students.
  We organized nearly 24h on-line support for students over Discord and on-site workshops.
  Ramon Antonio developed this course from scratch in 2019

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 32 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2017, reworked in 2019

COURSES 2018/2019

- Geoapplications Development (3 year, 1, 2 module) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Course page (slides, data, software, video, syllabus, etc.): http://rgeo.wikience.org
  Ramon Antonio developed this course from scratch in 2015 and is continuously improving it.

- Computer Networks (3 year, 3, 4 module; 16 students enrolled) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2019 and is continuously improving it.
  Students voted for the course as the best in 2 categories at once (see page № 46):
  ★ Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'
  ★ Category 'Best Course for New Knowledge and Skills'

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; 42 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2017, reworked in 2018

COURSES 2017/2018

- Geoapplications Development (3 year, 1, 2 module) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Course page (slides, data, software, video, syllabus, etc.): http://rgeo.wikience.org
  Ramon Antonio developed this course from scratch in 2015 and is continuously improving it.

- Operating Systems (2 year, 3, 4 module) RUS
  Roles: HOMEWORKS SEMINARS

- Research Seminar "Geographic Information Systems" (1 year, 1–3 module; ≈60 stud.) RUS
  Roles: SYLLABUS TEACHART HOMEWORKS SEMINARS EXAM
  Ramon Antonio developed this course from scratch in 2017 and is continuously improving it.

COURSES 2016/2017

- Geoapplications Development (3 year, 1, 2 module) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Course page (slides, data, software, video, syllabus, etc.): http://rgeo.wikience.org
  Ramon Antonio developed this course from scratch in 2015 and is continuously improving it.

- Software design (2 year, 1–4 module) RUS
  Roles: TEACHART HOMEWORKS SEMINARS EXAM

COURSES 2015/2016

- Geoapplications Development (3 year, 1–4 module) ENG
  Roles: SYLLABUS LECTURES TEACHART HOMEWORKS SEMINARS EXAM
  Course page (slides, data, software, video, syllabus, etc.): http://rgeo.wikience.org
  Ramon Antonio developed this course from scratch in 2015

- Software design (2 year, 1–4 module) RUS
  Roles: TEACHART HOMEWORKS SEMINARS EXAM

Final State Certification

At the Faculty of Computer Science, HSE University, students (4th year **Bachelor**, 2nd year **Masters**) have a mandatory Final State Certification.

Ramon Antonio has been a member of the State Examination Board at the Faculty of Computer Science in the following years (each year since 2016):

2016 2017 2018 2019 2020 2021 2022 2023 2024 2025

PhD Admission Committee

At the Faculty of Computer Science, HSE University, there is a Doctoral School in Computer Science.

Ramon Antonio has been a member of the PhD Admission Committee at the Faculty of Computer Science in the following years:

2023 2024 2025

PhD Dissertation Committees (Membership)

- Applicant: Razdiakonov Daniil Sergeevich
- Degree: PhD in Computer Science
- Dissertation topic: Method for visual management of ontological data in three-dimensional virtual space
- PhD Advisor: Muromcev Dmitriy Iliych
- Dissertation accepted for preliminary review: 13.06.2024
- Dissertation accepted for defense: 19.09.2024
- Defense date: 17.12.2024
- Dissertation Resume: URL
- Dissertation Page: hse.ru/sci/diss/934005754
- Committee Members: I. Makarov, P. Braslavski, T. Gavrilova, Y. Matveev, R.A. Rodriges Zalipynis

Student Evaluations Summary

A copy from the HSE University Portal (Ramon Antonio's personal cabinet) is below.

Teaching quality assessment by students

4.61 - mean value of the teaching quality assessment rating.

> Excellent evaluation by students of the quality of the teacher's work

The rating value shall be considered if the total number of surveyed students is at least 10, or at least 50% of the enrolment (in either case, no less than three students).

91% - the proportion of 4 and 5 points following the Teaching Quality Assessment

> 4-5 points significantly prevail over other point values; excellent attitude to the quality of the teacher's work on the part of students

- Shows a grouping of the ordinal scale of point values into categories without averaging them out
- The overall quantity of 4- and 5-point values for a given teacher's performance under a specific course shall be divided by the overall quantity of the point values given by all students for the teacher's work under the given course
- All such figures (individual, as calculated as a result of mathematical division) attributed to a certain teacher for various courses taught by him/her during a semester or the academic year, shall be averaged out
- The final value, for convenience, shall be expressed as a percentage (in a range from 0 to 100%)

Example of a calculation: Teacher A teaches 2 (two) courses. When evaluating the first course, 15 students gave him/her 4-5 points and 10 students - 1-3 points. When evaluating the second course, 18 students gave 4-5 points and three students gave the course just 1 point. For the first course, the proportion of 4- and 5-point scores shall come to (15 / 25) 60.00%; for the second course, respectively, (18 / 21) - 85.71%. The final value will be calculated as follows: (60.00% + 85.71%) / 2 = **72.85%**

Advising (Student Term / Thesis Papers)

Ramon Antonio's students primarily work with **geospatial data**, including Climate & Earth remote sensing data. We solve challenging problems ranging from analytics to visualization to simulation.

Each project consists of developing a software/doing research, extensive documentation on the project, preparing presentation, and oral defense (commission), see Regulations for Term Papers and Theses.

The students are from the Faculty of Computer Science unless otherwise stated.

Ramon Antonio is the sole supervisor of a student unless otherwise noted.

Publications with students

- R.A. Rodriges Zalipynis, N. Terlych (2022) **WebArrayDB: A Geospatial Array DBMS in Your Web Browser**. ***PVLDB***, 15(12): 3622–3625, 2022. DOI · PDF
- N. Terlych, R.A. Rodriges Zalipynis (2021) **Jupyter Lab Based System for Geospatial Environmental Data Processing**, *Proceedings of the Future Technologies Conference*, FTC 2020. Advances in Intelligent Systems and Computing (***AISC***), Vol. 2, P. 627–638, Springer. DOI
- K. Bykov, R.A. Rodriges Zalipynis (2021) **First Results of Performance Evaluation of Geospatial Raster Data Processing Systems**, *Proceedings of the International Conference "Russian Supercomputing Days 2021"*, P. 147–148. Max Press. DOI
- R.A. Rodriges Zalipynis, E. Pozdeev, A. Bryukhov (2018) **Array DBMS and Satellite Imagery: Towards Big Raster Data in the Cloud**, *International Conference on Analysis of Images, Social Networks and Texts* (AIST), Revised Selected Papers. Lecture Notes in Computer Science (***LNCS***), Vol. 10716, P. 267–279, Springer. DOI
  ★ Best talk award, certificate: PDF
- R.A. Rodriges Zalipynis, A. Bryukhov, E. Pozdeev (2017) **Retrospective Satellite Data in the Cloud: An Array DBMS Approach**, Supercomputing. RuSCDays 2017. Communications in Computer and Information Science (***CCIS***). Revised Selected Papers. Vol. 793, P. 351–362. Springer. DOI

PhD Students

- Nikita Terlych, "Geospatial Raster Data Management Approaches for Web Array DBMS", 2022 – current
- Khushbu Narottambhai Saradva, "Cellular Automata Simulation Approaches for Tensor DBMSs", 2024 – current ★ international student

Current Master Students

11 students from the Faculty of Computer Science, from Master's Programs:

- Data Science (4 students)
- Data Analysis in Biology and Medicine (1 student)
- System and Software Engineering (5 students)
- Financial Technologies and Data Analysis (1 student)

Research Competitions

- **Open International Competition of Student Research Papers** (NIRS Competition)
  My students won this Competition, which is highly selective, many times. For example, 1256 papers were submitted in 2016 from all over the world (HSE news).

  Unless otherwise noted, the students participated in the Nomination "The Best Research Work in Computer Science for Undergraduate and Specialist Students"
- **Yandex Stipend** (former I. Segalovich Stipend)

  The Competition for the stipend named after I. Segalovich – Wikipedia (Co-founder of Yandex).
  The stipend is payed during 1 year, details at the HSE portal.
- **1C Company Stipend**

  The Competition for the stipend of the 1C Company – Wikipedia.
  The stipend is payed during 1 year, details at the HSE portal.

2023 ★ **Winner: 1C Company stipend, HSE news to be published**
K. Mikhailova

2022 ★ **Winner: 1st place, HSE news**
★ Nomination "The Best Research Work on the World Economy, World Politics and Oriental Studies for Master's Students and Graduates of 2022"

A. Zuraev "Impact of Forest Wildfires on the Economic Wellbeing of Western Regions of the USA: Assessments Based on Machine Learning"

2022 ★ **Winner: I. Segalovich stipend, HSE news**
N. Igumnov

2021 ★ **Laureate, HSE news**
E. Gerasimenko "Spatial Decision Trees for Thematic Classification of Satellite Imagery"

2020 ★ **Winner: 2nd place, HSE news**
N. Igumnov "New Versions and Applications of Mo's Algorithm"

2019 ★ **Winner: 3rd place, HSE news**
E. Gerasimenko "Research and Development of Approaches for Approximate Computations in Array DBMS"

2019 ★ **Laureate, HSE news**
P. Antonov "Big Geospatial Data Processing on GPU"

2018 ★ **Winner: 1st place, HSE news**
★ Nomination "The Best Research Work in Computer Science for Master's Students and Graduates of 2022"

A. Fomenko "Research and Development of Methods for Creating Mosaics of Satellite Scenes"

2017 ★ **Winners (teamwork): 3rd place, HSE news**
A. Briukhov, E. Pozdeev "Research and Development of Methods for Distributed Processing of Raster Data"

2016 ★ **Winner: 1st place, HSE news**
E. Pozdeev "Research and Development of Methods for Intelligent Analysis of Large Volumes of Data using Google Earth Engine and R Environment"

Graduated Master Students

Data Science Master's Program

- Takweh Cedric Fonguh, Assessment of Air Pollution by Aerosols Using Earth Remote Sensing Data, 2024
  ★ international student
- Warda Tariq, Airlines Data Analysis Using SQL and Python, 2024
  ★ international student
- Z. Orynbasar, Mapping Plastic Waste with Earth Remote Sensing Data, 2023
  ★ international student
- A. Kulakov, Deep Learning Approaches for Tennis Match Tracking, 2023
  ★ a UK-based startup co-founder
- V. Cucinschi, Assessment of the Carbon Dioxide Emissions with Machine Learning, 2023
  ★ international student
- S. Mihailevschii, Counting Trees in an Area using Spatial Data, 2023
  ★ international student
- Emmanuel Adonis Septimus Turay, Data Science Techniques for Remote Sensing Monitoring of Minerals and Deposits from Space, 2022
  ★ international student
- A. Denisenko, Approximate Query Answering Techniques for Array DBMS, 2021

System and Software Engineering Master's Program

- D. Kireev, Spatial Data Processing Engine in a Web Browser using WebAssembly, 2024
- V. Kugay, Decentralized Approaches for Geospatial Data Exchange Using Web Technologies, 2023
- N. Terlych, Client-Server Technologies "WebGIS", 2022
  ★ Paper published in PVLDB, see "Papers with students": page № 22
  ★ Started his career as a Lecturer at HSE University in 2022,
  Faculty of Computer Science: HSE Homepage
- A. Ivanov, A Specialized GIS for Power Line Corridor Safety, 2022

Graduated Bachelor Students

World Economy Bachelor's Program

- A. Zuraev, Impact of Forest Wildfires on the Economic Wellbeing of Central and Western Regions of the USA, *Faculty of World Economy and International Affairs*, 2022
  ★ **Winner (1st place, 2018: HSE news)**
  A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
  ★ Continued as an M.S. student at the University of Milano-Bicocca, Milan, Italy (2022)

Data Science and Business Analytics Bachelor's Program

DUAL DEGREE PROGRAM: JOINTLY WITH THE LONDON SCHOOL OF ECONOMICS AND POLITICAL SCIENCE (**UNIVERSITY OF LONDON**)

- D. Ignatyev link **and** A. Lakeev link , System for Satellite Imagery Processing using SVM (Support Vector Machines), 2023
  ★ Team Project

Applied Mathematics and Information Science Bachelor's Program

- S. Polukhin, Language Server for Structured Query Language, 2024
- A. Balabanov, Comparative Evaluation of Multidimensional Array Storage Formats, 2023
- V. Vinogradov, Modelling Forest Fire Spread Using Cellular Automata, 2023
- A. Baduk, Research and Development of Methods for Indexing Big Satellite Data, 2022
- K. Barukhov, Methods for Processing Big Geospatial Data on Computer Cluster, 2022
  ★ joined Yandex

Software Engineering Bachelor's Program (ABET-accredited till 01 Oct 2022)

- K. Mikhailova, Service for Mapping Ice Conditions of the Northern Sea Route, 2023
  ★ industrial co-advisor: T. Aslyamov from greenatom.ru, an IT-integrator of the State Atomic Energy Corporation Rosatom (ROSATOM)
- I. Shalygin, File Storage Server based on Amazon S3 Protocol, 2023
- M. Guraevskiy (Web App), **and**, D. Efimov (Android App), **and**, R. Karabash (Server App): Silk Way: Electronic Trading Platform for Shared Wholesale Purchases, 2023
  ★ Team Project
- D. Zakirullin, Program for Route Modeling in Wireless Networks with Swarm Intelligence Algorithms, 2023
- D. Shcherbakov, Program for Visualizing Climate and Weather Data in JavaScript, 2023
- V. Radaykin, Web Application «Mail Client MyMail», 2023
- R. Nazarov, Evaluation of the TensorFlow System in the Cloud on Raster Data, 2023
- N. Novikov, Web-application for Climate Change Demonstration, 2022
- R. Imamov, Client-Server Application "Electronic Queue", 2022
- P. Shebarshin, Comparative Evaluation of Geospatial Raster Data Compression Techniques, 2022
- E. Gerasimenko, Research and Development of Spatial Decision Trees for Thematic Classification of Satellite Data, 2022
  ★ **Laureate (2021: HSE news)**
  ★ **Winner (2020: 3rd place, HSE news)**
  A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
- F. Deryabin, Evaluation of Distributed Python Libraries on Raster Data, 2022
- N. Safonov, Program for Ridesharing Planning, 2022
- K. Bykov, Performance Evaluation of Geospatial Raster Data Processing Systems, 2021
  ★ Paper published, see "Papers with students": page № 22

- D. Osipovich, Web-Application “Mail Client”, 2021
- A. Nesterov, Program for Pan-Sharpening of Satellite Scenes, 2021
- A. Zagitov, File Storage Server Based on Amazon S3 Protocol on Java, 2021
- A. Rakitin, Java Library for GeoTIFF Files Processing, 2021
- D. Sokolov, Java Library for Working with Virtual GDAL VRT Format, 2020
- I. Fefelov, Java library for the GeoTIFF format, 2020
- A. Buzulukov, System for Execution Control and Resource Management of Python Scripts, 2020
- A. Rakhmanovskiy, Application for Geospatial Data Processing Based on CUDA, 2020
- N. Terlych, Client-Server Application “Web GIS”. Faculty of Economics, Management, and Business Informatics, 2020
  ★ Paper published, see “Papers with students”: page № 22
- A. Lukin, Software System for Local Climate Zone Classification of Urban Areas, 2019
- I. Morozov, Performance Evaluation of Apache Spark on Raster Data, 2018
  ★ international student
- A. Briukhov, Client-Server Application "Web GIS", 2018
  ★ **Winner (3rd place, jointly with E. Pozdeev, 2017: HSE news)**
  A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
  ★ 2 papers published, see “Papers with students”: page № 22
- A. Fomenko, Application for Creating Mosaics of Satellite Scenes, 2018
  ★ **Winner (1st place, 2018: HSE news)**
  A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
- E. Pozdeev, Constructing High Resolution Maps of Aerosol Concentration using Machine Learning and Google Earth Engine, 2018
  ★ **Winner (1st place, 2016: HSE news)**
  ★ **Winner (3rd place, jointly with A. Briukhov, 2017: HSE news)**
  A highly-selective, Open International Competition of Student Research Papers: NIRS Competition
  ★ 2 papers published, see “Papers with students”: page № 22
- N. Melentev, Program for Satellite Imagery Feature Classification using Deep Learning, 2018
- A. Ekhin, Client-server Application “Local Mini-maps”, 2017
- I. Trofimov, Human-oriented Android Task Scheduler, 2017
  ★ a student with disabilities
- S. Sandomirskaia, Software for Creating Presentations Based on NASA WorldWind, 2016

INVITED TALKS

- ChronosDB: High Performance Processing of Earth Remote Sensing Data, 20th International Conference "Modern Problems of Remote Sensing of the Earth From Space", Moscow, Space Research Institute (Russian Academy of Sciences), Nov/2022. link
- Array DBMS: Problems, Technologies, and Perspectives, Moscow ACM SIGMOD Chapter, Lomonosov Moscow State University, Oct/2022. link
- Databases for Large Multidimensional Arrays: Current Progress and Challenges, 7th Open meeting of the Academic Council of the Faculty of Computer Science, HSE University, Sep/2022. link
- Towards Machine Learning in Distributed Array DBMS: Networking Considerations, Department of Software Engineering, HSE University, Dec/2020.
- Georeferenced Raster Data: Present and Future, Colloquium of the Faculty of Computer Science № 87, HSE University, Apr/2020.
- Earth Remote Sensing Data and Information Technology: Applications in Economics, Geoinformatics Group, HSE University, May/2019.
- INFORMATION TECHNOLOGIES FOR REANALYSIS AND EARTH REMOTE SENSING DATA MANAGEMENT, Research Computing Center, Lomonosov Moscow State University, Feb/2016.

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- "**Computer Program ChronosServer**" © Ramon Antonio Rodriges Zalipynis, wikience.org/chronosserver
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Note: language ENG – syllabus language is 100% in English

SERVICE

PLOS ONE EDITORIAL BOARD

2023 – current: link

ISSN: 1932-6203, ranked Q1

Responsibilities (see link)

Oversee the peer review process from beginning to end, taking responsibility for conducting an initial assessment based on the PLOS ONE Criteria for Publication, finding and inviting reviewers, evaluating their feedback, making editorial decisions, and communicating decisions to authors. Academic Editors play an active role in the community, and are highly engaged as representatives of PLOS ONE.

To ensure an efficient peer review process for our authors, the Academic Editors strive to:

- Agree to handle one to two new manuscript assignments per month
- Handle each manuscript assignment from first assessment to final decision
- Respond to manuscript invitations (Accept or Decline) within two days
- Assess whether the manuscript is suitable for peer review within four days of agreeing to the invitation
- Secure at least one reviewer on manuscripts that are suitable for review
- Submit a decision within four days of receipt of the complete reviews
- Adhere to Editorial and Publishing Policies

PC MEMBERSHIP / COMMITTEES

★ **VLDB 2023**
Tutorial Track PC Member: VLDB 2023 Call for Tutorials

★ **VLDB 2024**
Tutorial Committee Member: VLDB 2024 Call for Tutorials

CONFERENCE ORGANIZATION

- **Data Fusion 2023**
  MODERATOR: "GeoAnalytics" Section
  RESPONSIBILITIES: speaker search & invitation, review of talk proposals, forming the section program, running the section during the conference.
  Data Fusion is a major conference with the participation of leading companies, e.g., VK, VTB, MTS, Tele2, and others: Conference Program

REVIEWER BOARD MEMBER

- 2021 – current: link, Future Internet (ISSN: 1999-5903, ranked Q2)

Achievements made by Future Internet in 2022:

1. CiteScore: 5.4 (+31.7% compared with 2021).
2. CiteScoreTracker 2022: 6.3 (+16.7% compared with that published by Elsevier in June 2022).
3. Publications: 374 (+13.7% compared with 2021).
4. Citations: 3100 (+34.9% compared with 2021).

REVIEWER (see Publons)

- ACM Transactions on Database Systems (TODS)
  ISSN 0362-5915, 1557-4644
  4-Year Impact Factor: 6.022 (2020), ranked Q1
- Remote Sensing
  ISSN 2072-4292
  5-Year Impact Factor: 5.6 (2022), 4.9 (2024), ranked Q1
- ISPRS International Journal of Geo-Information
  ISSN 2220-9964
  5-Year Impact Factor: 3.5 (2022), 3.0 (2024), ranked Q1
- International Journal of Digital Earth (IJDE)
  ISSN 1753-8947, 1753-8955
  5-Year Impact Factor: 4.5 (2022) ranked Q1
  IJDE Certificate of Appreciation for Ramon Antonio
- Sustainability
  ISSN 2071-1050
  5-Year Impact Factor: 3.473 (2022), 3.6 (2024), ranked Q2
- Algorithms
  ISSN 1999-4893
  5-Year Impact Factor: 1.9 (2024), ranked Q2-Q3
- Sensors
  ISSN 1424-3210, 1424-8220
  5-Year Impact Factor: 4.1 (2022), 3.7 (2024), ranked Q1-Q2
- Applied Sciences
  ISSN 2076-3417
  5-Year Impact Factor: 2.9 (2022), 2.7 (2024), ranked Q2
- Electronics
  ISSN 2079-9292
  5-Year Impact Factor: 2.9 (2022), 2.6 (2024), ranked Q2

CONTINUING EDUCATION / PROFESSIONAL RETRAINING / INTERNSHIPS / STUDY ABROAD

May/2022–June/2022 Course "**Effective use of voice and speech resources in teaching**"
HSE University

Jan/2022 Course "**Educational system SMARTLMS**"
HSE University

Aug/2020–Sep/2020 Course "**Psychological subtleties of teaching**"
HSE University

Feb/2015–May/2015 Course "**Modern Climate Change**"
University of Missouri, Columbia, USA
Professor A. Lupo
internal, exam, certificate №10201, PDF

2009–2010 Trainings by **Sun Microsystems (acquired by Oracle)**
Fundamentals of the Java (TM) Programming Language (SL-110-SE6)
Object-Oriented Analysis and Design Using UML (OO-226)
Java (TM) Programming Language (SL-275-SE6)
Developing GUI with Java based on Swing (DTW-3400)
Developing Mobile Phone Applications with J2ME (TM) Technology (DTJ-365)
Developing Innovative Multimedia JavaFX Applications (DTJ-2510)

2008 Trainings by **Microsoft**
Course "MPI Programming with C++, High Performance Computing, and Deploying, Managing, and Maintaining
Microsoft (R) Windows (R) Compute Cluster Server 2003"

VLDB 2021 TUTORIAL

R.A. Rodriges Zalipynis. Array DBMS: Past, Present, and (Near) Future. ***PVLDB***, 14(12): 3186–3189, 2021. DOI · PDF

Abstract. Array DBMSs strive to be the best systems for managing, processing, and even visualizing big N-d arrays. The last decade blossomed with R&D in array DBMS, making it a young and fast-evolving area. We present the first comprehensive tutorial on array DBMS R&D. We start from past impactful results that are still relevant today, then we cover contemporary array DBMSs, array-oriented systems, and state-of-the-art research in array management, flavored with numerous promising R&D opportunities for future work. A great deal of our tutorial was not covered in any previous tutorial or survey article. Advanced array management research is just emerging and many R&D opportunities still "lie on the surface". Hence, nowadays we have the most favorable conditions to start contributing to this research area. This tutorial will jump-start such efforts.

Tutorial duration: 90 *minutes (*1.5 *hours).*

The Tutorial is included in the main conference program, main conference day.

Only 8 tutorials were accepted to VLDB 2021: accepted tutorials

Day 3: Wednesday, Aug 18								
Local Time	Copenhagen Time	Blomstersalen	Congress Hall	Ballonsalen	Columbine	Vandsalen	Pjerrot	Harlekin
10:00	9:00	Industry 2: Databases for Data warehouse and Invited Talk (3 talks)	Research Session 16: NLP for Databases (5 talks)	Research Session 17: Machine Learning for Databases (5 talks)	Research Session 18: Query Optimization (5 talks)	Research Session 19: Data Streams I (5 talks)	Research Session 20: Graph Management I (5 talks)	Tutorial 3: Array DBMS: Past, Present, and (Near) Future
10:15	9:15							
10:30	9:30							
10:45	9:45							
11:00	10:00							
11:15	10:15							

★ Attendance: 37 people attended the tutorial.

Reviewers' feedback:

★ "*a crisp and well-articulated*"

★ "*The author has an impressive recent expertise developing and publishing academic work in the scientific area.*"

★ "*The tutorial does a very good job at convincing readers of the interest of the topic and of the breadth and variety of tools and techniques.*"

The Tutorial Homepage contains high-quality video: http://vldb2021.gis.gg

Language Proficiency

English **C1/C2 (Advanced/Proficiency)**

Rationale:

1. **International certificate**

   IELTS Academic (2021): 7.5
   Level: C1/C2 (Advanced/Proficiency)
   Reading 8/9, Listening 8.5/9, Writing 7/9, Speaking 7/9

   BRITISH COUNCIL Cambridge Assessment English

2. **Many years of teaching experience in English**

   Students often vote for the courses as the best in several categories at once:
   ★ Best Course for Career Development
   ★ Best Course for Broadening Horizons and Diversity of Knowledge and Skills
   ★ Best Course for New Knowledge and Skills

   Courses taught in English: see page № 13

3. **Publications at top conferences and journals, for example**:

   VLDB 2018 · SIGMOD 2019 · VLDB 2020 · SIGMOD 2021 · VLDB 2021 · VLDB 2022 · VLDB 2023

   Please, refer to page № 2 (high quality audio-video recordings are freely available)

4. **Service for top conferences and journals, for example**:

   VLDB, PLOS, TODS, Future Internet, and others

   Please, refer to page № 28

5. **A tutorial at VLDB 2021**, a premier international conference (page № 31)

   Duration: 90 minutes (1.5 hours)
   Main conference program, main conference day
   Only 8 tutorials were accepted to VLDB 2021
   High-quality videos: http://vldb2021.gis.gg/

Russian Native
Ukrainian Native

Selected Competitions

1. **Won twice (2008 and 2009)** Zavtra.UA scholarship program: All-Ukrainian competition for yearly scholarship. It is the first Ukrainian, privately funded, nation-wide initiative for supporting young talents.
2. **1st prize, 2008, the final** of All-Ukrainian Research Competition "Informatics, computer science and automation", Sebastopol, Ukraine. This is a highly competitive program under the direction of the Ministry of Education and Science of Ukraine, in which all Ukrainian universities participate.
3. **2nd prize, 2008, in the final of Microsoft** All-Ukrainian Competition in High Performance Computing (HPC) Research Projects (Kiev, Ukraine).

Methods for solving graph partitioning problems using a cluster computer network

Rodriges Zalipynis R. A.

Advisor: Ladyzhensky Y. V.

Master's Dissertation 2008

Applied Mathematics and Informatics Department
Computing Machinery and Informatics Faculty

Motivation

The graph partitioning problem arises in load balancing for computer networks, parallel solution of aerodynamics and thermodynamics problems, image segmentation, VLSI design, and other practically important areas.

The development of efficient parallel algorithms for graph partitioning is extremely important. Today, applications need to quickly partition graphs that consist of 10^7 – 10^8 vertices. This is impossible on single-processor machines.

Project Goal

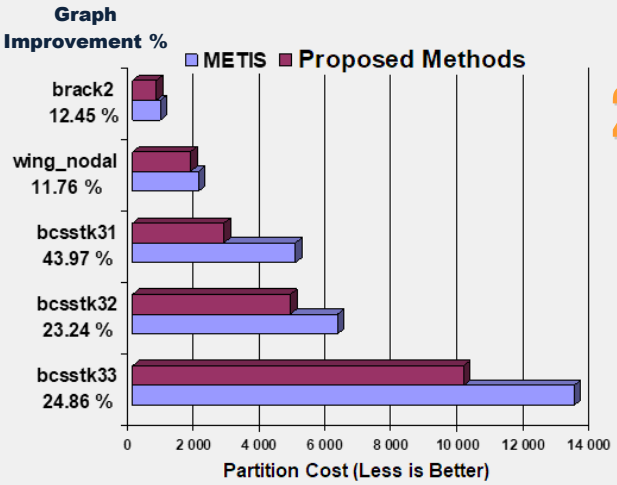
Improve the efficiency of solving problems of graph partitioning on a computer cluster.

Project Tasks

1) analyze existing graph partitioning techniques
2) develop new efficient graph partitioning methods
3) develop a software system for implementing parallel methods for partitioning graphs on a computer cluster
4) experimentally evaluate the proposed parallel methods for partitioning graphs on a computer cluster

Main Results

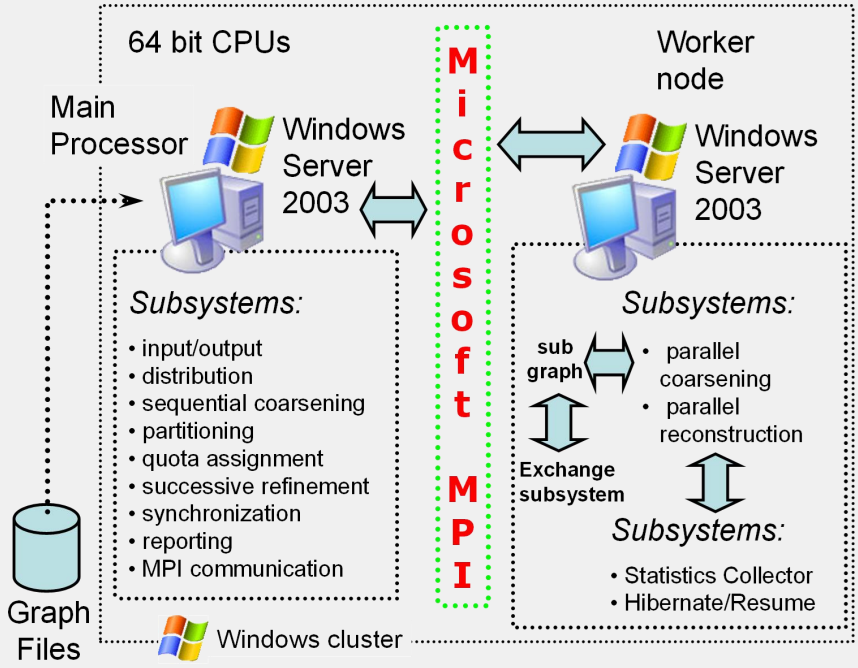
1 **New heuristic is proposed and implemented** for coarsening in the multilevel graph partitioning paradigm



2 **Experiments were carried out on graphs from the widely known graph collection** for benchmarking graph partitioning algorithms

3 For some graphs, new methods found partitions that are **up to 44% better of the partitions found by METIS – a state-of-the-art system for graph partitioning**

4 **A new object-oriented software architecture has been developed for parallel distributed partitioning of graphs on a computer cluster**



ChronosDB: Distributed, File Based, Geospatial Array DBMS

An array DBMS streamlines large N-d array management

ChronosDB is by up to 75x faster than SciDB on average

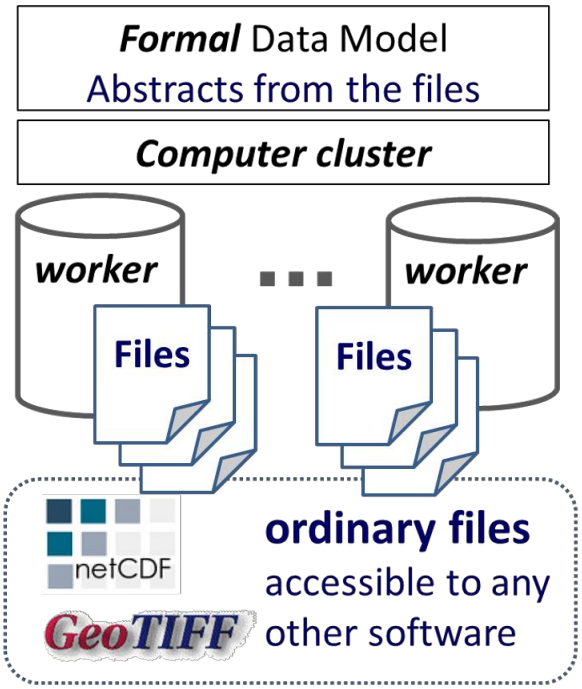
SciDB is the only freely available distributed array DBMS to date

Demo dataset

the mosaic of 4×8 raw Landsat scenes GeoTIFF

ChronosDB dataset names: `Landsat8.Level_1.Surface Reflectance.Band4, Band5`

ChronosDB Architecture



ChronosDB Array Schema

Users avoid learning a new array schema notation and inspect ChronosDB datasets in a way they are accustomed to

```
gdalinfo Landsat8.Level_1.SurfaceReflectance.Band4

Driver: GTiff/GeoTIFF
Size is 38673, 24937
Coordinate System is:
PROJCS["WGS 84 / UTM zone 32N", <skipped> AUTHORITY["EPSG","32632"]]
Origin = (-53110.000000000000000,5878570.000000000000000)
Pixel Size = (30.000000000000000,-30.000000000000000)
Metadata:
  AREA_OR_POINT=Area
Corner Coordinates:
Upper Left  (  -53110.000, 5878570.000) (  0d47'37.30"E, 52d46'20.14"N)
Lower Left  (  -53110.000, 5130460.000) (  1d50'34.16"E, 46d 6'11.15"N)
Upper Right ( 1107080.000, 5878570.000) ( 17d59'48.38"E, 52d42'52.21"N)
Lower Right ( 1107080.000, 5130460.000) ( 16d50'57.11"E, 46d 3'26.67"N)
Center      (  526985.000, 5504515.000) (  9d22'26.95"E, 49d41'33.18"N)
Subarray=2048x2048 Block=2048x1 Type=UInt16, ColorInterp=Gray
  NoData Value=0
```

ChronosDB Query Language

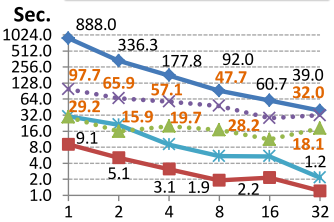
Queries can implement complex analytic pipelines

```
gdalwarp -tr 15 15 Band4_2048_2048 $redWarp
gdalwarp -tr 15 15 Band5_4096_4096 $nirWarp
gdal_calc -A $nirWarp -B $redWarp \
        --calc "(A.astype(float)-B)/
                (A.astype(float)+B+0.8)*(1+0.8)" \
        --type Float32 --out $SAVI
gdalwarp -tr 960 960 $SAVI SAVIoutlook
```

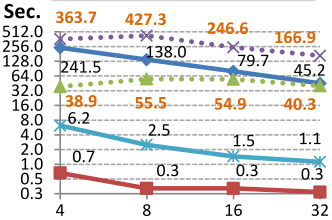
Users avoid learning a new language and work with ChronosDB like with already familiar command line tools in a console

Performance

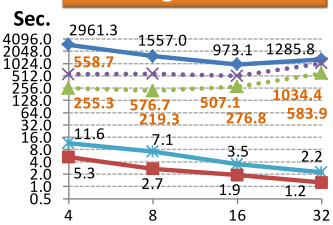
Multiresolution pyramid: 11 – 97×



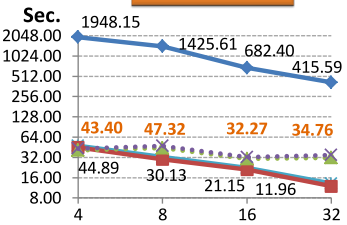
Extract array part: 38 – 427×



Chunking: 219 – 1034×



SAVI: 32 – 47×



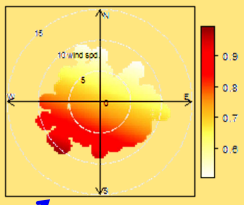
The horizontal axes plot the number of cluster nodes.

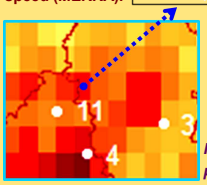
SciDB ChronosDB Cold Hot Ratio SciDB/ChronosDB Cold Hot

ANALYSIS

All data stored at Climate Wikience are directly accessible from R analysis environment. It contains over 5000 packages to date including spatial analysis, time series processing, environmental modeling and much more http://www.r-project.org/

The SO_2 concentration dependence (Aura satellite) near thermal power station (11) on wind direction and speed (MERRA).





The diagram center corresponds to zero wind speed which increases radially outward.

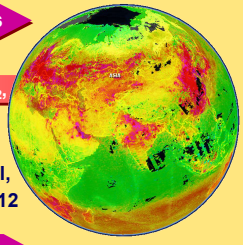
*Risk of moderate air pollution by SO_2 **

THE SET OF VARIABLES VISIBLE TO A USER AND R CONNECTIVITY ARE PROVIDED ON DEMAND.

ACCESS TO DATA SAMPLES

WWW.WIKIENCE.ORG

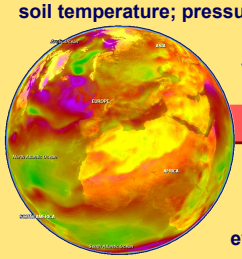
TRACE GASES



O_3, H_2O, SO_2, CH_4, N_2O, NO_2, HCHO, CO_2, CO, BrO, OClO, Aerosol, CFC-11, CFC-12

METEOROLOGY

Over 80 variables: atmosphere, ocean, soil temperature; pressure; albedo; clouds, soil, water properties; wind speed and direction; precipitation, evaporation,...



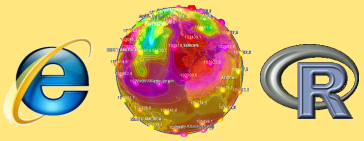
VEGETATION

NDVI, SRI, EVI, LAI, SGI, FPAR, ARVI, RENDVI, MRESRI, VREI, REPI, PRI, SIPI, RGRI, NDNI, CAI, ...

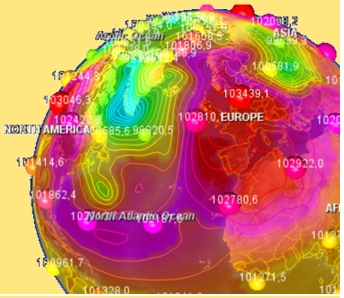
1 HR – 1 DAY UP 9×14 KM GLOBALLY

CLIMATE WIKIENCE

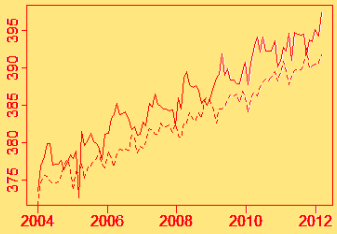
LARGE GEODATA VOLUMES



ACCESS	3D VISUALIZATION	ANALYSIS
700+ datasets TBs of data Reanalysis Remote sensing	Interactive Intuitive 3D isolines 3D surfaces 3D markers	5000+ packages Spatial Time series Modeling and more



Monthly CO_2 concentration (ppm) at Ukraine (47° , 35°), solid, and tropics (–11°, 15°), dash. Built using AIRS satellite radiometer data.

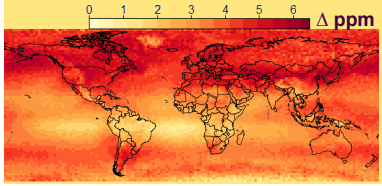


The seamless access from R to data available at Climate Wikience allows to forget about NetCDF, HDF, Grib, etc., their big volumes and concentrate on data.

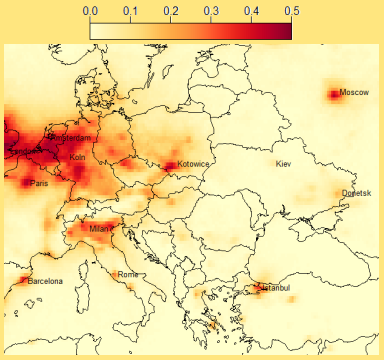
R code sample for above CO_2 chart:

```
1 library(RWikience)
2 w <- WikienceConnect()
3 t_co2 <- readTimeSeriesAtLatLon
    (w, "AIRS_AMSU.CO2", 47, 35)
4 CO2_monthly <-
   aggregate(t_co2["value"],
     format(t_co2["date"], "%Y-%m"),
     mean, na.rm = TRUE)
```

Mean differences of CO_2 trends (7 years of global daily satellite data processed)*



Risk of moderate air pollution by nitrogen di-oxide (NO_2). The map resolution is ~27,5×18 km. To build the map, daily Aura NO_2 satellite data from 01.10.2004 to 20.06.2012 were processed.



Air pollution risk is defined as the probability of observing a pollutant concentration in a given interval over the territory under investigation.*

Aerosol optical thickness over Rome, Terra MODIS

* **Rodriges Zalipynis R.A.** The place of Ukraine in Europe according to the level of air pollution using Earth remote sensing data, Proceedings of IV All-Ukrainian Congress of Ecologists with International Participation, Vinnytsia, Ukraine, 25 - 27 September, 2013. – 552 pp. – P. 130 – 132. Available at www.wikience.org/rodriges

ChronosServer

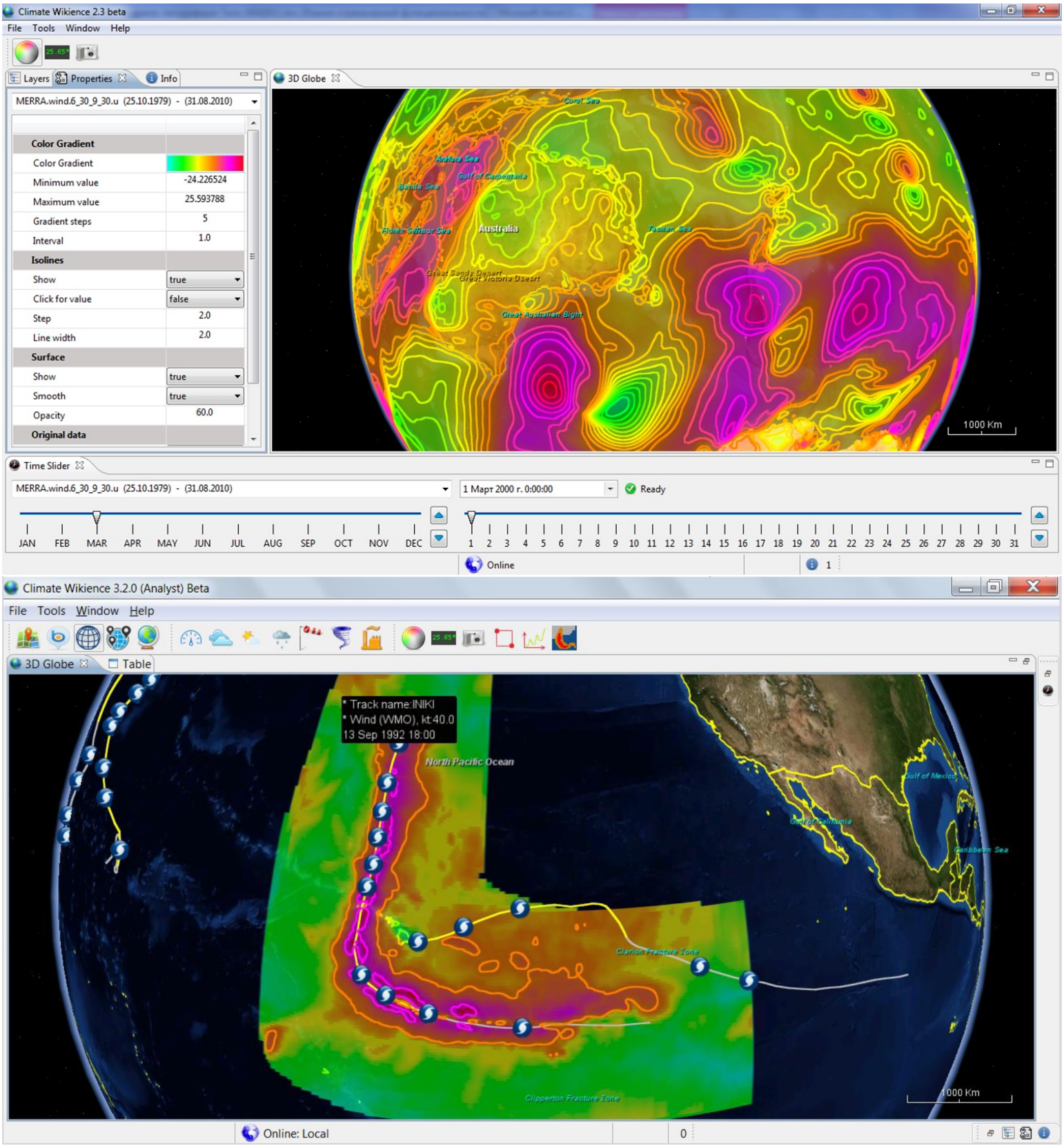
The Climate Wikience backend, ChronosServer, runs on a computer cluster of commodity hardware and possess scalability, high availability, and fault tolerance properties. It works with diverse storage formats "in-situ" while it was designed and implemented to be inherently distributed. This is the first system combining both in-situ and distributed approach. *

* Rodriges Zalipynis R.A., ChronosServer: real-time access to "native" multi-terabyte retrospective data warehouse by thousands of concurrent clients. Informatics, cybernetics and computer engineering, pp. 151–161. Vol. 14 (188), Donetsk, DonNTU, 2011.

Climate Wikience was supported by Civilian Research and Development Foundation (CRDF) of the United States of America during 2011–2013, grant № UKM1-2973-DO-09.
It was a joint research project of Donetsk National Technical University (Ukraine) and University of Minnesota (USA).

Climate Wikience architecture, presented analysis, brochure design by Antonio Rodriges

rodriges@wikience.org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Gulf of Mexico
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Caribbean Sea
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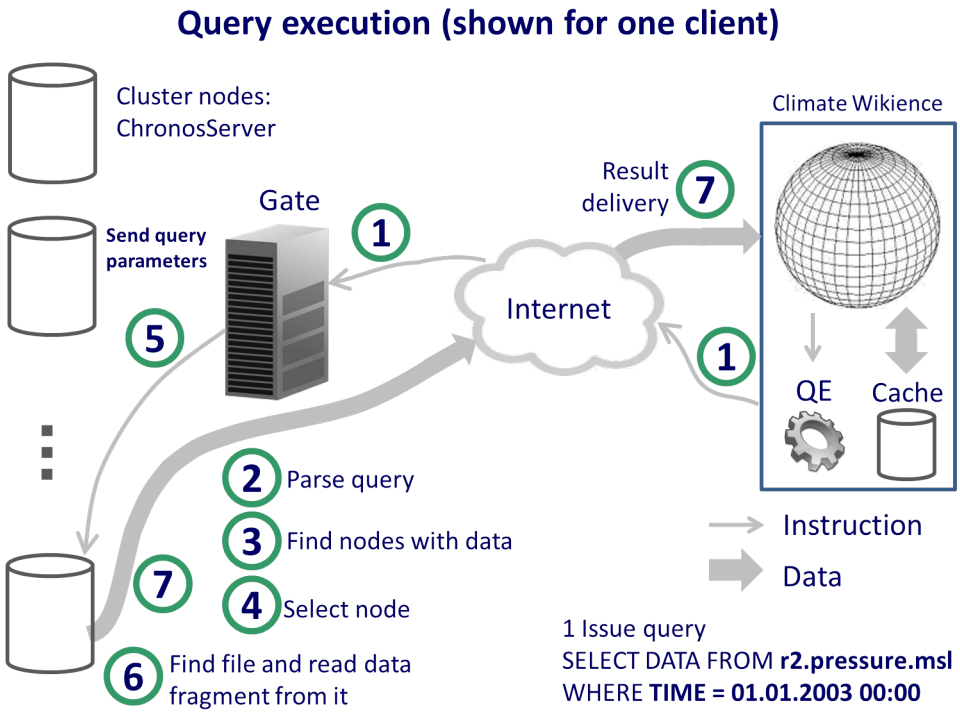
CHRONOSSERVER

Distributed, high performance array/tensor data dissemination server for thousands of concurrent clients

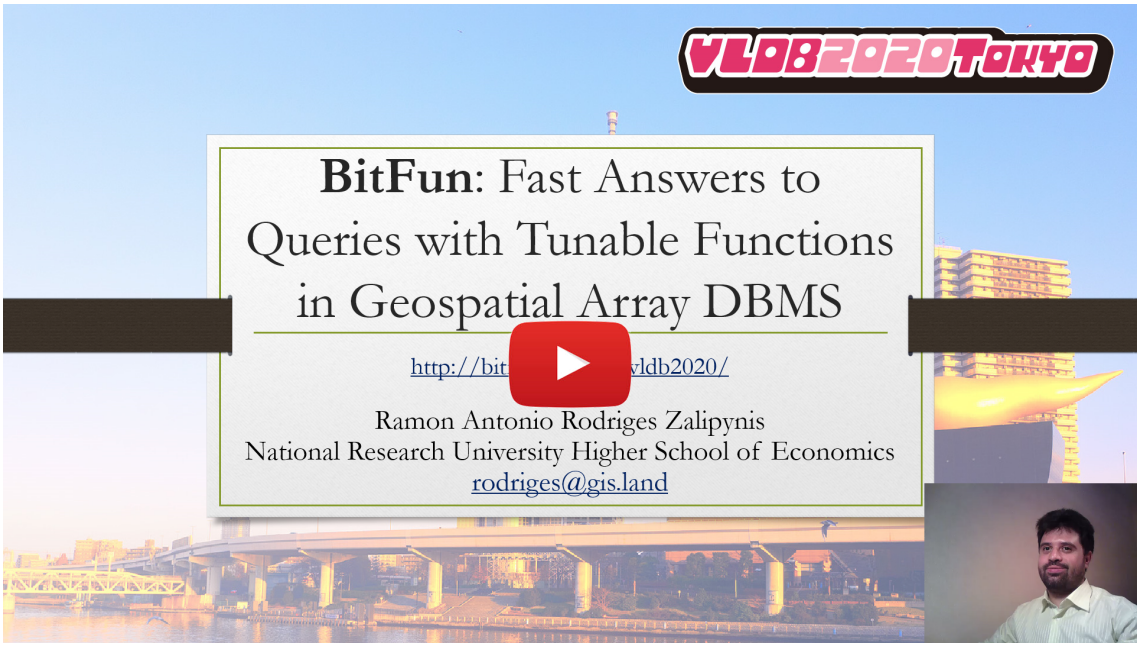
Web: http://www.wikience.org/chronosserver/



CHRONOSSERVER is the back-end of **CLIMATE WIKIENCE**. It delivers climate reanalysis, Earth remote sensing, and other array-structured data over the Internet in near real-time to your PC for interactive 3D visualization in **CLIMATE WIKIENCE** and analysis in R.

R.A. Rodriges Zalipynis. *ChronosServer: real-time access to "native" multi-terabyte retrospective data warehouse by thousands of concurrent clients. Inf., Cyb. and Comp. Eng.*, 14(188):151–161, 2011 PDF

Abstract: ChronosServer runs on a cluster of commodity hardware and possesses scalability, high availability, and fault tolerance properties. It turns vast amounts of already existing data into actionable intelligence with no changes to the source data files. ChronosServer discovers files on cluster nodes, analyses their structure, and provides format independent SQL-like query model to access their contents. It is capable to read compressed data directly in various formats, including NetCDF, GeoTIFF, GRIB, HDF, and many others. This entirely preserves original file metadata as is, vital for its correct interpretation and processing by other software. New data are added to the system in a seamless plug-and-play fashion by simple copying it to a cluster node reducing administration overheads. This allows existing software like GIS or statistical packages to operate on files in use by ChronosServer as well as unmodified legacy code to generate data for it. ChronosServer preserves operational infrastructure intact avoiding painful, time-consuming and error-prone data conversions while offering additional opportunities for data analysis.

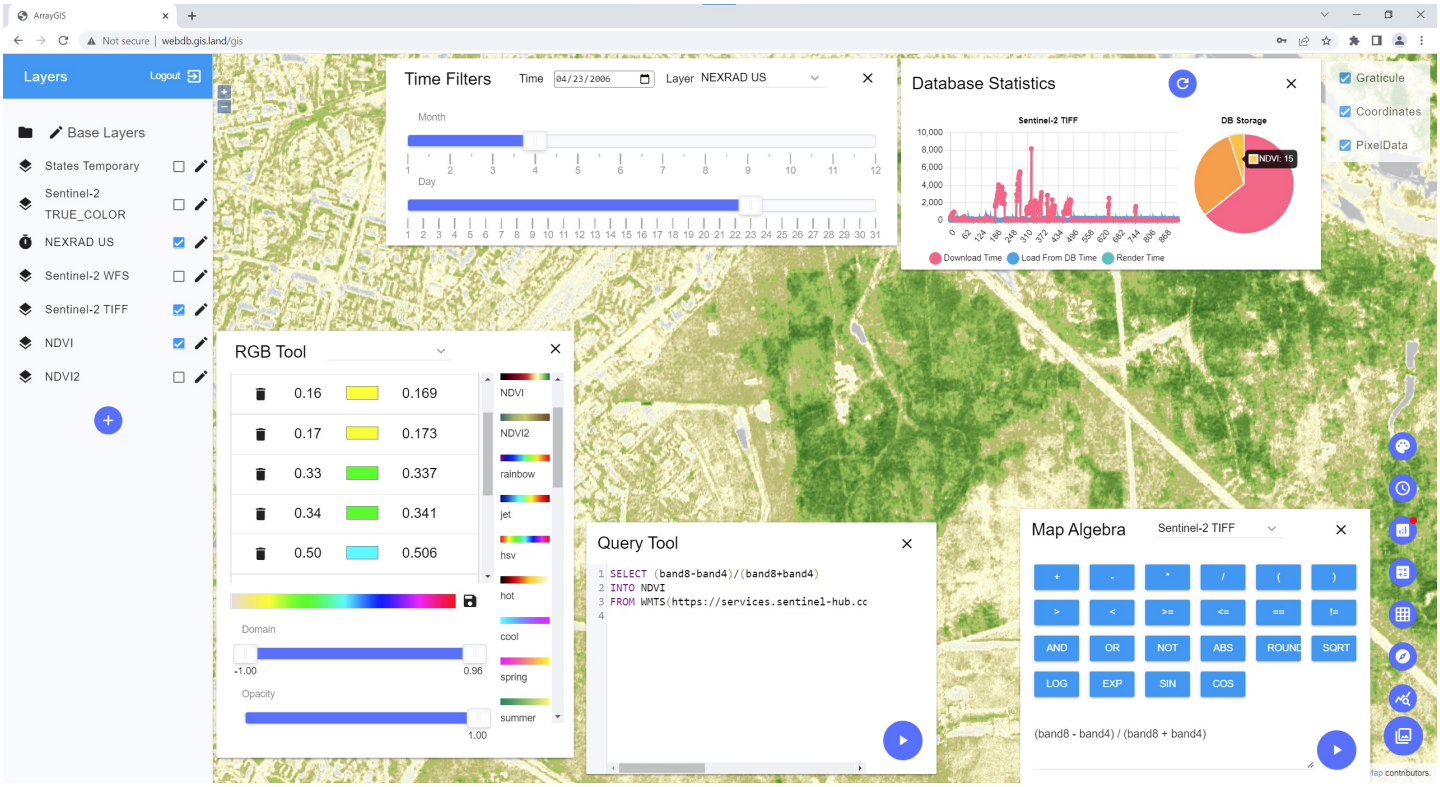


Web: http://bitfun.gis.land

Abstract: BITFUN provides novel indexing strategies to continuously re-index arrays during queries with similar mathematical functions. We describe BITFUN and offer lessons on real-world geospatial data, related to real practical tasks. A lesson involves tuning a math function parameter while the rich Web GUI details the indexing process and query execution. You will appreciate BITFUN approaches, its performance, and learn its internals via fascinating lessons.

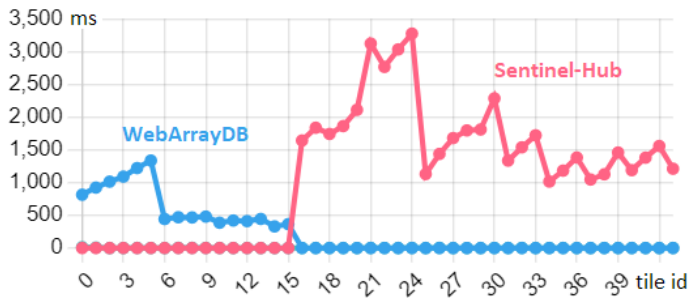
Fast Interactive Data Science. BITFUN supports fast interactive Data Science. Geo-, Bio-informatics, Ecology, Agriculture, Medicine, and many other sciences often require researchers to spend vast amounts of time for interactive data science. Researchers can experience increased response times from computer systems that process big array data. As a researcher typically spends their time waiting for such responses in front of a computer, each successive data processing delay, even within 1–2 seconds, increases human fatigue and thereby reduces the quality of work and understanding of the data.

BITFUN, a novel data management technique, significantly accelerates interactive computations of a mathematical function $f(\tau, \cdot)$ with a parameter τ that is experimentally tuned by a researcher [3]. Dozens of such functions exist, see e.g. Earth remote sensing domain (Journal of Sensors, 2017): SAVI $= (\text{NIR} - \text{R})/(\text{NIR} + \text{R} + \tau) \times (1 + \tau)$, PVI, WDRVI, etc. For SAVI, $\tau \in [0, 1]$, NIR and R are 2-d arrays (e.g., mosaics of satellite scenes) with intensities of reflected solar radiation in near-infrared and visible red spectrum respectively. As output, $f(\tau, \cdot)$ produces an array. A researcher can tune τ multiple times, e.g. $\tau_{new} = \tau_{old} + \Delta\tau$, to find appropriate $f(\tau, \cdot)$ values for an area of interest. BITFUN can compute $f(\tau + \Delta\tau, \cdot)$ by an order of magnitude faster than previous approaches [3].



Web: wikience.github.io/webdb2022

Abstract: Geospatial array DBMSs operate on georeferenced N-d arrays. They provide storage engines, query parsers, and processing capabilities as their core functionality. Traditionally, those have been too heavy for a Web browser to support. Hence, Web Applications, mostly Geographic Information Systems (GISs), run array management on their server back-ends that return small portions of the results via the network. We showcase WEBARRAYDB, the first geospatial array DBMS that can run completely inside a Web browser. We demonstrate that modern Web browsers, JavaScript, and respective software libraries are sufficiently mature to build and run such a feature-rich and powerful DBMS. A Web-based array DBMS should reduce server load, enable offline work, decrease network I/O, and improve user experience. We also present ARRAYGIS, our new Web GIS based on WEBARRAYDB, and invite everyone to explore both via a freely accessible, informative, and interactive Web GUI.

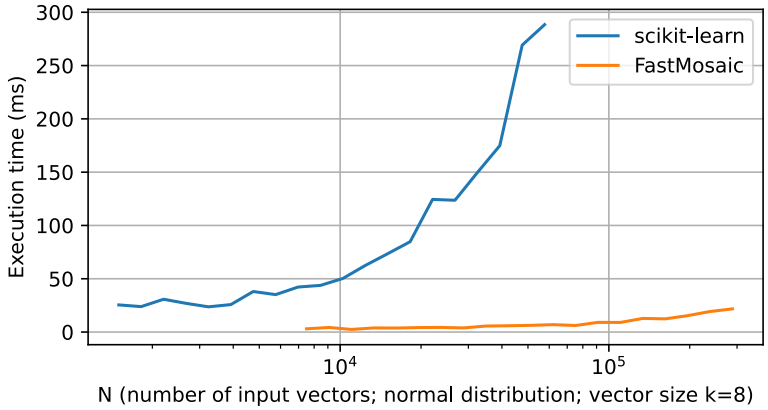


Latency:
WEBARRAYDB vs. Sentinel-Hub
(a product by Sinergise, acquired by Planet)

Abstract: Array DBMSs manage big N-d arrays, are not yet widely known, but are experiencing an R&D surge due to the rapid growth of array volumes. Cellular automata (CA) operate on a discrete lattice of cells that can be modeled by an N-d array. CA are successfully applied to model fire spread, land cover change, road traffic, and other processes. We made traffic CA simulations possible by array DBMS due to novel components: native UDF language, proactive exec plans, convolution operator, retiling strategy, array versioning, locks, virtual axes, etc. A database approach to CA brings powerful parallelization, data fusion, array processing, and interoperability to name a few. To our best knowledge, our work is the first to run end-to-end CA simulations completely inside array DBMS: we enable array DBMS to simulate the physical world for the first time. **See**: http://sigmod2021.gis.gg | http://vldb2022.gis.gg

Web: wikience.github.io/fastmosaic2023

Abstract: Array DBMSs operate on N-d arrays. During the Data Ingestion phase, the widely used mosaic operator ingests a massive collection of overlapping arrays into a single large array, called mosaic. The operator can utilize sophisticated statistical and machine learning techniques, e.g. Canonical Correlation Analysis (CCA), to produce a high quality seamless mosaic where the contrasts between the values of cells taken from input overlapping arrays are minimized. However, the performance bottleneck becomes a major challenge when applying such advanced techniques over increasingly growing array volumes. We introduce a new, scalable way to perform CCA that is orders of magnitude faster than the popular Python's scikit-learn library for the purpose of array mosaicking. Furthermore, we developed a hybrid web-desktop application to showcase our novel FastMosaic operator, based on this new CCA. A rich GUI enables to comprehensively investigate in/out arrays, interactively guides through an end-to-end mosaic construction on real-world geospatial arrays using FastMosaic, facilitating a convenient exploration of the FastMosaic pipeline and its internals.



Performance of
Canonical Correlation Analysis:
FASTMOSAIC vs. Python scikit-learn

MASTER 2023/2024

Geospatial Data Science

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Data Science)

Area of studies: Applied Mathematics and Informatics

Delivered by: School of Software Engineering

Where: Faculty of Computer Science

When: 1 year, 1, 2 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Master's programme: Data Science

Language: English

ECTS credits: 6

Contact hours: 44

Course Syllabus

Full Syllabus

Abstract

Video-presentation: https://youtu.be/CEU8hLDVJjI Abstract: About 80% of data has a location component [1]. Geospatial data are diverse and ubiquitous: GPS, maps, satellite imagery, to name a few. Apple [2], Uber [3], MasterCard [4], Google [5] and many other companies heavily utilize geospatial data. However, geospatial data are different from other data types and it is impossible to analyze geospatial data correctly without special knowledge. The "Geospatial Data Science" course gives core theory and algorithms to successfully work with geospatial data: Coordinates and Projections, Spatial Data Formats, Spatial Data Processing (including map algebra and topology), Spatial Data Algorithms, Spatial Data Mining, and other important topics. The course is beneficial for a Data Scientist as it gives expertise to solve practical tasks in public, business, private sectors as well as to do research in Geospatial Data Science. [1]

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**
Syllabus & More information: https://www.hse.ru/en/edu/courses/835158040

MASTER 2022/2023

Geospatial Data Science

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Data Science)

Area of studies: Applied Mathematics and Informatics

Delivered by: School of Software Engineering

Where: Faculty of Computer Science

When: 1 year, 1, 2 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Master's programme: Data Science

Language: English

ECTS credits: 6

Course Syllabus

Full Syllabus

Abstract

About 80% of data has a location component [1]. Geospatial data are diverse and ubiquitous: GPS, maps, satellite imagery, to name a few. Apple [2], Uber [3], MasterCard [4], Google [5] and many other companies heavily utilize geospatial data. However, geospatial data are different from other data types and it is impossible to analyze geospatial data correctly without special knowledge. The "Geospatial Data Science" course gives core theory and algorithms to successfully work with geospatial data: Coordinates and Projections, Spatial Data Formats, Spatial Data Processing (including map algebra and topology), Spatial Data Algorithms, Spatial Data Mining, and other important topics. The course is beneficial for a Data Scientist as it gives expertise to solve practical tasks in public, business, private sectors as well as to do research in Geospatial Data Science.

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**
Syllabus & More information: https://www.hse.ru/en/edu/courses/646510680

MASTER 2021/2022

Geospatial Data Science

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Data Science)

Area of studies: Applied Mathematics and Informatics

Delivered by: School of Software Engineering

When: 1 year, 1, 2 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Master's programme: Data Science

Language: English

ECTS credits: 4

Course Syllabus

Full Syllabus

Abstract

About 80% of data has a location component [1]. Geospatial data are diverse and ubiquitous: GPS, maps, satellite imagery, to name a few. Apple [2], Uber [3], MasterCard [4], Google [5] and many other companies heavily utilize geospatial data. However, geospatial data are different from other data types and it is impossible to analyze geospatial data correctly without special knowledge. The "Geospatial Data Science" course gives core theory and algorithms to successfully work with geospatial data: Coordinates and Projections, Spatial Data Formats, Spatial Data Processing (including map algebra and topology), Spatial Data Algorithms, Spatial Data Mining, and other important topics. The course is beneficial for a Data Scientist as it gives expertise to solve practical tasks in public, business, private sectors as well as to do research in Geospatial Data Science.

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**
Syllabus & More information: https://www.hse.ru/en/edu/courses/506519309

BACHELOR 2020/2021

Computer Networks

Category 'Best Course for Career Development'

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 3 year, 3, 4 module

Mode of studies: offline

Instructors: Ramon Antonio Rodriges Zalipynis

Language: English

ECTS credits: 5

Course Syllabus

Full Syllabus

Abstract

Computer Networks are ubiquitous in the modern IT sector. Computer Networks are arteries of databases, web & mobile applications, distributed systems and many other software. A good understanding of the underlying networking principles facilitates in building more reliable and efficient software products. This makes the Computer Networks course highly beneficial for any modern software engineer.

★ **According to the students' votes, the course is the best in all possible categories at once. More information**: https://www.hse.ru/en/edu/courses/375278638

BACHELOR 2018/2019

Computer Networks

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 3 year, 3, 4 module

Mode of studies: offline

Instructors: Ramon Antonio Rodriges Zalipynis

Language: English

ECTS credits: 5

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**

More information: https://www.hse.ru/en/edu/courses/219873311

BACHELOR 2021/2022

Research Seminar "Geographic Information Systems"

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 1 year, 1-3 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Language: Russian

ECTS credits: 3

★ **According to the students' votes, the course was selected as the best in one of the categories.**

More information: https://www.hse.ru/en/edu/courses/470907181

BACHELOR 2020/2021

Research Seminar "Geographic Information Systems"

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 1 year, 3 module

Mode of studies: offline

Instructors: Ramon Antonio Rodriges Zalipynis

Language: Russian

ECTS credits: 3

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**

More information: https://www.hse.ru/en/edu/courses/396734929

BACHELOR 2021/2022

Research Seminar "Swarm Intelligence Algorithms"

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 4 year, 1-3 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Language: Russian

ECTS credits: 3

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**

More information: https://www.hse.ru/en/edu/courses/470895411

HSE University Menu

BACHELOR 2021/2022

Computer Networks

Category 'Best Course for Career Development'

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

When: 3 year, 3, 4 module

Mode of studies: offline

Open to: students of one campus

Instructors: Ramon Antonio Rodriges Zalipynis

Language: English

ECTS credits: 5

Course Syllabus

Full Syllabus

Abstract

Computer Networks are ubiquitous in the modern IT sector. Computer Networks are arteries of data-bases, web and mobile applications, distributed systems and many other software. A good understanding of the underlying networking principles facilitates in building more reliable and efficient software products. This makes the Computer Networks course highly beneficial for any modern software engineer.

★ **According to the students' votes, the course is the best in all possible categories at once. More information**: https://www.hse.ru/en/edu/courses/339493635

BACHELOR 2022/2023

Research Seminar "Geographic Information Systems"

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

Where: Faculty of Computer Science

When: 1 year, 1-3 module

Mode of studies: offline

Open to: students of all HSE University campuses

Instructors: Ramon Antonio Rodriges Zalipynis

Language: Russian

ECTS credits: 3

Contact hours: 44

★ **According to the students' votes, the course was selected as the best in one of the categories.**

More information: https://www.hse.ru/en/edu/courses/646494172

BACHELOR 2023/2024

Spatial Data Management

Category 'Best Course for Broadening Horizons and Diversity of Knowledge and Skills'

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

Where: Faculty of Computer Science

When: 3 year, 1, 2 module

Mode of studies: offline

Open to: students of all HSE University campuses

Instructors: Ramon Antonio Rodriges Zalipynis

Language: English

ECTS credits: 5

Contact hours: 56

Course Syllabus

Full Syllabus

Abstract

Spatial Data Management Course gives in-depth and fundamental knowledge on spatial data technological and theoretical stack of spatial data tools, systems, libraries as well as definitions, algorithms, approaches respectively. We cover all aspects of programmatic management of spatial data including storage, processing, and visualization. The primary programming languages are Java, Python, and JavaScript. We use real-world spatial data like city maps and satellite observations. The course has one control work, homeworks, and exam as its assessment types. After successfully completing the course, the student will deeply understand the peculiarities of spatial data, will know core theory on spatial data management, and will be able to apply key spatial management techniques with popular system tools in practice.

★ **According to the students' votes, the course was selected as the best in 2 categories at once.**
Syllabus & More information: https://www.hse.ru/en/edu/courses/836731568

BACHELOR 2023/2024

Mathematical Modeling and Simulation

Category 'Best Course for New Knowledge and Skills'

Type: Elective course (Software Engineering)

Area of studies: Software Engineering

Delivered by: School of Software Engineering

Where: Faculty of Computer Science

When: 4 year, 1-3 module

Mode of studies: offline

Open to: students of all HSE University campuses

Instructors: Ramon Antonio Rodriges Zalipynis

Language: English

ECTS credits: 10

Contact hours: 60

Course Syllabus

Full Syllabus

Abstract

Models are often built to answer "WHAT–IF" questions with less cost, time, and efforts compared to the physical implementation of real changes or construction of real objects. For example, "Will the traffic density on the road will likely decrease by about 25% IF we add a second lane?". To verify the hypothesis, we do not construct a lane which is costly, time-consuming, and may not decrease the traffic density at all. Mathematical and Simulation Modeling is vital for computer science, biology, epidemiology, business, technology, network theory, economics and social sciences, management of resources, self-driving cars, physics, chemistry, Earth science and is also used in music, linguistics, and psychology to name a few. Mathematical and Simulation Modeling covers agent-based modeling, cellular automata, computer simulation and includes model training, tuning, and evaluation. Mathematical and Simulation Modeling combines methods from statistics, machine learning, probability theory, automata theory, optimization, decision making theory, game theory as well as a broad range of other mathematical and computational disciplines.

★ **According to the students' votes, the course was selected as the 'Best Course for New Knowledge and Skills'**

Syllabus & More information: https://www.hse.ru/en/edu/courses/835169735

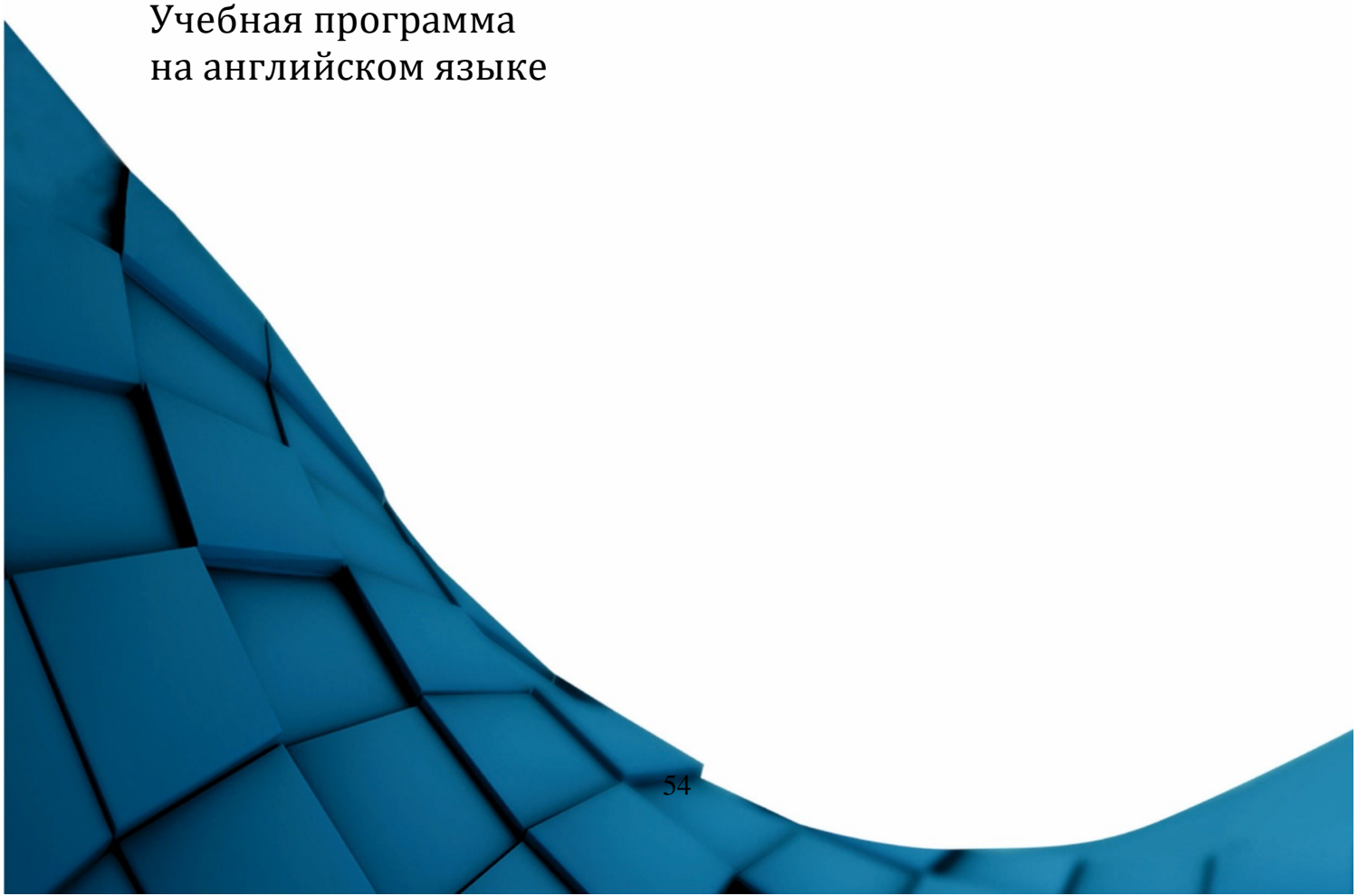
R.A. Rodriges Zalipynis
Р.А. Родригес Залепинос

Spatial Data Management

Управление пространственными данными

Course Syllabus
(Curriculum)
in English

Учебная программа
на английском языке



GOVERNMENT OF THE RUSSIAN FEDERATION
FEDERAL STATE AUTONOMOUS
EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
NATIONAL RESEARCH UNIVERSITY
"HIGHER SCHOOL OF ECONOMICS"
(HSE UNIVERSITY)

Faculty of Computer Science
School of Software Engineering

Ramon Antonio Rodriges Zalipynis

Spatial Data Management

Course Syllabus (Curriculum)

Electronic Edition

Saint Petersburg
Naukoemkie Technologii
2023

ISBN 978-5-907804-14-2

Reviewers:

Boris G. Mirkin, Doctor of Sciences, Professor, School of Data Analysis and Artificial Intelligence, Faculty of Computer Science, HSE University.
Valery V. Shilov, PhD, Professor, School of Software Engineering, Faculty of Computer Science, HSE University.

R.A. Rodriges Zalipynis. Spatial Data Management [Electronic Resource] = Spatial Data Management: Course Syllabus (Curriculum). – Text electronic edition (3.3 MB). – St. Petersburg: Naukoemkie Technologii, 2023. – 30 P. – 1 electronic optical disk (CD-ROM).

ISBN 978-5-907804-14-2

Experts estimate that location (spatial) components are part of about 80% of all data in the world. Spatial Data are crucial for Urban, Forest, and Water Management, Rapid Response to Emergencies, Air Quality Control, Food Security, Environmental Monitoring, and myriads of other practical tasks.

The Course Syllabus (Curriculum) proposes to acquire fundamental knowledge and skills in Spatial Data Management by studying the Theoretical Stack (includes definitions, algorithms, and approaches) and the Technological Stack (includes instruments, systems, and libraries) of the subject area. The course broadly covers programmatic aspects of spatial data management including spatial data storage, processing, and visualization. We use real-world spatial data, for example, vector city maps and Earth remote sensing data. The Course Syllabus (Curriculum) can help students deeply understand spatial data peculiarities, master the theoretical basis, and undergo intensive practical training in applying key methods and tools for managing spatial data.

University instructors, senior undergraduate and junior graduate computer science students, as well as anyone interested in Spatial Data Management are the target audience for this Course Syllabus (Curriculum).

Text electronic edition

Minimal system requirements:
- CPU: Intel x86, x64, AMD x86, x64 at least 1 GHz;
- RAM: at least 512 MB;
- Free disk space: at least 120 MB;
- Adobe Acrobat Reader or other PDF reader;
- CD-ROM.

ISBN 978-5-907804-14-2

Educational publication

Rodriges Zalipynis Ramon Antonio

Spatial Data Management

Course Syllabus (Curriculum)
in English

Electronic Edition

Signed up for use 25.12.2023
Publication volume: 3.3 MB.
Edition contents: 1 CD.
Edition circulation: 100 CD.

Naukoemkie Technologii, Publishing House
Intel Group Corporation, Ltd.
https://publishing.intelgr.com
E-mail: publishing@intelgr.com
Tel.: +7 (812) 945-50-63

ISBN 978-5-907804-14-2

R.A. Rodriges Zalipynis
Р.А. Родригес Залепинос

Computer Networks

Компьютерные сети

Course Syllabus
(Curriculum)
in English

Учебная программа
на английском языке

GOVERNMENT OF THE RUSSIAN FEDERATION
FEDERAL STATE AUTONOMOUS
EDUCATIONAL INSTITUTION OF HIGHER EDUCATION
NATIONAL RESEARCH UNIVERSITY
"HIGHER SCHOOL OF ECONOMICS"
(HSE UNIVERSITY)

Faculty of Computer Science
School of Software Engineering

Ramon Antonio Rodriges Zalipynis

Computer Networks

Course Syllabus (Curriculum)

Electronic Edition

Saint Petersburg
Naukoemkie Technologii
2024

ISBN 978-5-907804-23-4

Reviewers:

Boris G. Mirkin, Doctor of Sciences, Professor, School of Data Analysis and Artificial Intelligence, Faculty of Computer Science, HSE University.
Valery V. Shilov, PhD, Professor, School of Software Engineering, Faculty of Computer Science, HSE University.

R.A. Rodriges Zalipynis. Computer Networks [Electronic Resource] = Computer Networks: Course Syllabus (Curriculum). – Text electronic edition (0.9 MB). – St. Petersburg: Naukoemkie Technologii, 2024. – 32 P. – 1 electronic optical disk (CD-ROM).

ISBN 978-5-907804-23-4

Computer Networks are ubiquitous in the modern IT sector. Computer Networks are veins of DBMSs, Web & Mobile Applications, Distributed Systems, and many other software products. A good understanding of the underlying networking principles facilitates building more reliable and efficient software products. This makes this Computer Networks Course Syllabus (Curriculum) highly beneficial for educating future modern software engineers.

This Course Syllabus (Curriculum) proposes to acquire theoretical knowledge, practical skills, and programming experience in the area of Computer Networks: how Computer Networks function, how Computer Network protocols work, what software is needed to investigate Computer Networks, software networking frameworks and libraries to code networking applications.

University instructors, senior undergraduate and junior graduate computer science students, as well as anyone interested in studying Computer Networks are the target audience for this Course Syllabus (Curriculum).

Text electronic edition

Minimal system requirements:
- CPU: Intel x86, x64, AMD x86, x64 at least 1 GHz;
- RAM: at least 512 MB;
- Free disk space: at least 120 MB;
- Adobe Acrobat Reader or other PDF reader;
- CD-ROM.

Educational publication

Rodriges Zalipynis Ramon Antonio

Computer Networks

Course Syllabus (Curriculum)
in English

Electronic Edition

Signed up for use 25.01.2024
Publication volume – 0.9 MB.
Edition contents – 1 CD.
Edition circulation – 100 CD.

Publisher « Naukoemkie Technologii»
Intel Group Corporation, Ltd.
https://publishing.intelgr.com
E-mail: publishing@intelgr.com
Tel.: +7 (812) 945-50-63

ISBN 978-5-907804-23-4