10 DECEMBER

08:30 Registration. Coffee

09:30 Main track — The Blue Hall
"ISP RAS: 80th Anniversary of Victor Ivannikov"
Discussion: RAS leaders, members of Russian government, RAS institutes, universities, ISP RAS scientific and business partners.

12:00 Buffet lunch

12:00 Virtual exhibition of technologies at online.isprasopen.ru

13:00 Digital medicine roundtable — The Blue Hall
Invited participants represent Moscow State University Clinic, I.M. Sechenov First Moscow State Medical University, National Medical and Surgical Center named after N.I. Pirogov, Vorohobov's City Clinical Hospital No. 67, Research Institute of Obstetrics and Gynecology named after D.O. Ott, National Medical Research Center for Endocrinology, Research Institute of Human Morphology and others.

15:30 Coffee break

16:00 Cybersecurity roundtable — The Blue Hall
Invited participants represent FSTEC of Russia as well as Kaspersky Lab, Postgres Professional, IVK, Security Code, Bellsoft, Ideco and others.

OPEN SOURCE SOFTWARE IN CONTINUUM MECHANICS PROBLEMS SOLVING

The scientific tracks will be held online at online.isprasopen.ru

13:00 Philippe Fraunié Professor at Toulon University, research director at Mediterranean Institute of Oceanography (M.I.O) Université Toulon
Studying energy dissipation process in ocean surface

13:50 Bo Yang PhD, Qin Zhang PhD, Bingchen Liang PhD, Xin Liu PhD, Mengxiang Qu (College of Engineering Ocean University of China, Qingdao), Erwan Bertevas PhD, (Keppel-NUS Corporate Laboratory National University of Singapore), Matvey Kraposhin PhD (ISP RAS)
Numerical simulation of the interaction between suspended sediment and moving plate based on the drift-flux model

14:10 Tianyuan Wang Dr.-Ing., Hongda Shi PhD, Qin Zhang PhD, Bo Yang PhD, Xin Liu PhD (College of Engineering Ocean University of China, Qingdao), Matvey Kraposhin PhD (ISP RAS)
Research on the wake of the ducted propeller with POD and DMD

14:30 Break

14:40 Konstantin Belyaev PhD (Shirshov Institute of Oceanology of RAS), Andrey Kuleshov Dr. Sci. (Keldysh Institute of Applied Mathematics, RAS), Ilya Smirnov (MSU)
Spatial decomposition of covariance functions in the process of data assimilation by a generalized Kalman filter method

15:00 Yuli Chashechkin PhD (IpMech RAS), and Iaroslav Zagumennyi PhD (Institute of Hydromechanics of National Academy of Sciences of Ukraine)
Numerical and laboratory study of flows around a tilted plate

15:20 Jackson Tellez-Alvarez PhD (FLUMEN Research Institute, Department of Civil and Environmental Engineering Technical University of Catalonia Barcelona, Spain), Sergei Strijhak PhD (ISP RAS)
The multifractal analysis in Geophysical Flows. In memory of Prof. Jose Manuel Redondo Apraiz

15:40 Coffee break

15:20 Ilias Sibgatullin PhD (Shirshov Institute of Oceanology of RAS), Stepan Elistratov (MSU) Kirill Vatutin (ISP RAS) Evgeny Ermaniuk PhD (Lavrentyev Institute of Hydrodynamics of the Siberian Branch of RAS), Evgeny Mikhailov (MSU)
Wave attractors and accumulation of wave energy in large aspect ratio domains

16:20 Artem Nuriev PhD (KFU)
Three-dimensional numerical simulation of fluid dynamics around vibrating beams

TECHNOLOGIES OF PROGRAM ANALYSIS, MODELING AND TRANSFORMATION

The scientific tracks will be held online at online.isprasopen.ru

13:00 Alexey Borodin PhD, Irina Dudina PhD (ISP RAS)
Symbolic Execution Based Intra-procedural Analysis for Search for Defects

13:25 Petr Sovetov (RTU MIREA)
Accelerating the development of DSL compilers for specialized processors

13:50 Aleksandra Soroka (Samsung RnD Institute Rus)
ML-based Clang optimization passes selection for binary code size reduction

14:15 Viacheslav Barinov, Mikhail Kashkarov and Andrey Kazmin (Samsung Russian Research Center)
Applying compiler-based binary watermarking technology to ensure binary compatibility in GNU/Linux distribution

14:40 Alexander Gerasimov PhD, Petr Privalov, Sergey Vladimirov, Veronica Butkevich, Anna Gorelova, Natalya Chernova (Huawei, Russia)
An approach to assuring quality of automatic program analysis tools

15:05 Rafael Sadykov and Mikhail Mandrykin PhD (ISP RAS)
Formally verified complete quantifier instantiation strategy for the theory of bounded linear integer arithmetic

15:30 Coffee break

16:00 Nikolaj Bjorner (Microsoft Research)
Invited talk: Navigating the Universe of Z3 Theory Solvers
Abstract: Satisfiability Modulo Theories solvers rely on a tight integration of specialized engines of proof. Each engine owns a piece of the global puzzle and implements specialized algorithms. For example, Z3's engine for arithmetic integrates Simplex, cuts and polynomial reasoning, while an engine for strings are regular expressions integrate methods for symbolic derivatives of regular languages. The talk takes as starting point the Z3 solver from Microsoft Research and presents an overview of theory solvers, how it is shaped by driving scenarios, recent advances and outlines main principles underlying both solver design and integration: A central claim used as a guide for symbolic solvers is exploiting a duality between finding satisfying solutions and finding refutation proofs. Orthogonal angles include meshing global and local inferences and exploiting global propagation engines. We give exemplars of exploiting global inferences and global propagators in support of a broader claim; that these advances owe to confluences between fields such as operations research, software engineering, network design, and algorithms.

16:50 Marvin Häuser (Technische Universitat Kaiserslautern) and Vitaly Cheptsov (ISP RAS)
Securing the EDK II Image Loader

17:15 Sergey Polyakov, Alexey Borodin PhD (ISP RAS)
Deadlock Detection using Static Analysis

DECEMBER 10TH START AT 12:40 VIRTUAL EXHIBITION OF TECHNOLOGI

Virtual exhibition of technologies will be held online at online.isprasopen.ru

12:00, 14:00 Asperitas and Cloud Solutions Family
Asperitas is a platform for data storage and performing complex resource-intensive calculations on demand. It includes a cloud environment also called Asperitas (listed as No. 5921 in the Unified Register of Russian Programs) as well as Michman, a PaaS orchestrator, and Clouni, an IaaS orchestrator. Fanlight, a web laboratories platform, is also a part of ISP RAS cloud solutions family (listed in the Register as No. 6066).

12:00, 14:00 AstraVer Verification Toolset
AstraVer Toolset is a deductive verification system for key software components. It allows developing and verifying security policy models as well as proving the correctness of software modules written in the C programming language. Astraver is essential for ensuring the required trust levels from ADV_SPM and ADV_FSP assurance families as defined in the ISO/IEC 15408 standard.

13:00, 15:00 BinSide: A Binary Code Static Analysis Tool
BinSide is a static program analysis platform for finding defects in binary code. It is useful when checking programs without source code, such as closed source 3rd party libraries, as well as assisting with required static information to dynamic analysis tools.

15:20 Casr: crash analysis and severity reporter tool
Casr creates automatic reports for crashes happening during program testing or deployment. The tool works by analyzing Linux coredump files. The resulting reports contain the crash's severity and additional data that is helpful for pinpointing the error cause.

12:00, 14:00 Constructivity 4D: A Technology of Indexing, Searching and Analysis of Large Spatial-Temporal Data
Constructivity 4D is a technology for creating innovative software services that are capable of processing highly dynamic scenes and vast arrays of spatial and temporal data. It performs visual analysis of millions of objects with individual geometry and dynamic behavior. Constructivity is deployed within the Synchro system that is used for 4D modeling of extremely large construction sites.

12:00, 14:00 ISP Crusher: A Dynamic Analysis Toolset
ISP Crusher is a toolset that combines various dynamic analysis approaches. It includes ISP Fuzzer, a fuzzing tool, and SyDr, an automatic test generation tool for complex programs. Two other ISP RAS analyzers, BinSide and Casr, will be included in Crusher within the next two years. Crusher allows organizing a development process that is fully compliant with GOST R 56939-2016 and other regulatory requirements of FSTEC of Russia.

12:40, 14:40 Dedoc: A Document Structure Retrieval System
Dedoc is an open universal system for converting documents to a unified format. формату. It extracts a document's logical structure, its tables and metadata. The document's contents are represented as a tree storing headings and lists of any level. Dedoc can be integrated in document contents and structure analysis systems as a separate modul.

12:20, 14:20 DigiTEF, A Digital Twin Platform
DigiTEF is a software platform based on OpenFOAM and other open source tools, as well as unique modules and libraries developed at ISP RAS. DigiTEF solves various application problems of gas dynamics, aerodynamics, hydrodynamics, and acoustics. It is tailored for creating and working with highly sophisticated digital models of industrial devices. DigiTEF is included in the Unified Register of Russian Programs (No. 5377).

13:00, 15:00 Klever: A Software Verification Framewor
Klever is a framework for checking models extracted from the source code of large software systems developed in the C programming language. Klever performs automated verification of various security and safety requirements.

12:20, 14:20 Lingvodoc: A Virtual Laboratory for Documenting Endangered Languages
Lingvodoc is a system intended for collaborative multi-user documentation of endangered languages, for creating multi-layered dictionaries and performing scientific work with the received sound and text data. It is a joint project with the Institute of Linguistics of the Russian Academy of Sciences and Tomsk State University. Lingvodoc is under active development since 2012 and can be found on lingvodoc.ispras.ru.

12:20, 14:20 MASIW: Support for Designing Highly Reliable Software System
MASIW is a toolset for developing highly reliable hardware and software systems for avionics, medicine, and other safety critical areas. It is designed for engineers creating airborne hardware/software systems that are developed using the integrated modular avionics (IMA) approach. MASIW can be easily adapted for other application areas.

12:40, 14:40 MicroTESK: A Test Program Generato
MicroTESK is an industry-targeted framework for generating test programs for functional verification of microprocessors. Based on formal specifications of microprocessor architectures, MicroTESK allows constructing test program generators automatically. MicroTESK supports a variety of architectures ranging from CISC/DSP to RISC and VLIW. MicroTESK supports online test program generation.

12:20, 14:20 Protosphere: A Network Traffic Analyzer
Protosphere is a system of deep packet inspection (DPI). It can serve as a part of intrusion and information leak protection systems. Protosphere detects inconsistencies between a protocol specification and the actual traffic. It allows you to add support quickly for new protocols (either open or closed) due to the flexibility of its internal representation.

12:40, 14:40 ISP RAS Software Analysis Platform based on QEMU
ISP RAS Foundation Platform for creating program analysis systems is built on top of open source QEMU emulator. This framework is essential for organizing multi platform and cross platform development. It supports reverse debugging and introspection features, as well as full system emulation mode for debugging low-level software.

13:00, 15:00 SciNoon: Exploratory Search System for Scientific Groups
SciNoon is a system for collaborative exploration of scientific papers. It is essential for a group of researchers to dive quickly into the new area of knowledge and to find answers on their questions, following up with tracking new research on the topic of interest with highly customizable alerts.

12:00, 14:00 Svace Static Analyzer
Svace is an essential tool of the secure software development life cycle, the main static analyzer that is used in Samsung Corp. It detects more than 50 critical error types as well as hundreds of coding issues. Svace supports C, C++, C#, and Java, with preview support of Kotlin and Go. Svace is included in the Unified Register of Russian Programs (No.4047).

13:20, 15:20 Texterra: A Semantic Analyzer
Texterra is a scalable platform for extracting semantics from text. It contains the complete fundamental set of technologies for creating multifunctional applications for text analysis. Texterra bases its semantic analysis approach on concept identification. The platform is included in the Unified Register of Russian Programs (No.4048).

12:20, 14:20 ISP Obfuscator
ISP Obfuscator is a set of technologies to prevent mass exploitation of vulnerabilities resulting from errors or backdoors. In case a hacker is capable of attacking one of the devices that has certain software installed, the rest will remain protected by changes to the code that the tool made.

12:00, 14:00 TRAWL: A Binary Code Analysis Platform
TRAWL is a unique production-level tool for analyzing various binary code features that supports multiple target processor architectures. It does not require debug information or source code. Trawl can be used to analyze all kinds of software ranging from boot loaders to user-level applications. It is included in the Unified Register of Russian Programs (No.5323).

Time will be announced EC-leasing

Time will be announced Open Mobile Platform

ORGANIZER AND CO-ORGANIZERS

PARTNERS

INFORMATIONAL PARTNERS

11 DECEMBER

12:40 Open source software in continuum mechanics problems solving. Poster session online.isprasopen
Participant introduction: 11:40–12:00

MANAGEMENT OF DATA AND INFORMATION SYSTEM

The scientific tracks will be held online at online.isprasopen.ru

10:30 Andrey Fomichev (Head of Service at Yandex)
Yandex Database Serverless,
a database virtualization approach

11:00 Konstantin Avrachenkov (Director of Research, INRIA Sophia Antipoli)
Semi-supervised learning on graphs

11:30 Sergey Kuznetsov, PhD (ISP RAS), Pavel Velikhov, Qiang Fu (Huawei Russian Research Institute)
Real-time analytics, hybrid transactional/analytical processing, in-memory data management, and non-volatile memory

12:00 Alexander Shmid (EC-leasing company)
Practice and perspectives of using emulators family of mainframe architectures IBM

12:20 Break

12:30 Artem Polyakov, Alexandr Efimov and Konstantin Kramarenko (SIBSUTIS)
Key-value database access optimization for PMIx standard implementation

12:50 Mikhail G. Babenko PhD, Andrei Tchernykh PhD (ISP RAS), Bernardo Pulido-Gaytan PhD (CICESE Research Center, Ensenada, Mexico) , Elena Golimblevskaya (NCFU), Jorge Mario Cortés-Mendoza (South Ural State University) and Arutyun Avetisyan PhD (ISP RAS)
Experimental Evaluation of Homomorphic Comparison Methods

13:10 Maxim Ryndin, Denis Turdakov PhD, Sergey Kuznetsov PhD (ISP RAS)
Catalyst: Combining Co-training and Active Learning for Lifelong Classification

13:30 Andrey Sakhovskiy, Valery Solovyev PhD and Marina Solnyshkina PhD (KFU)
Topic Modeling for Assessment of Text Complexity in Russian Textbooks

13:50 Break

14:00 Andrey Mikhaylov PhD, Alexey Shigarov PhD, Egor Rozkov PhD , Igor Cherepanov (SB RAS)
On Graph-Based Verification for PDF Table Detection

14:20 Andrei Tchernykh PhD (ISP RAS), Adrián Facio Medina, Bernardo Pulido-Gaytan PhD (CICESE Research Center, Ensenada, Mexico), Jorge Mario Cortés-Mendoza, Gleb Radchenko (South Ural State University), Mikhail Babenko PhD (NCFU), Igor Chernykh PhD, Igor Kulikov PhD (ICMMG SB RAS), Sergio Nesmachnow PhD and Raul Rivera-Rodriguez (The University of the Republic, Uruguay)
Toward digital twins' workload allocation on clouds with low-cost microservices streaming interaction

14:40 Elena Aksenova, Nikita Lazarev, David Badalyan, Oleg Borisenko and Roman Pastukhov (ISP RAS)
Michman, an orchestrator to deploy distributed services in cloud environments

15:00 Valeriya Shvetcova, Oleg Borisenko (ISP RAS) and Maxim Polischuk (The Bauman Moscow State Technical University)
Using Ansible as Part of TOSCA Orchestrator

15:20 Irina Enyagina and Andrey Polyakov PhD (NRC "Kurchatov Institute")
Digital Lab platform as an environment for scientific research and development at the Kurchatov Institute

15:40 Break

16:00 Poltavtseva Maria PhD (SPbPU)
Heterogeneous Data Aggregation and Normalization in Information Security Monitoring and Intrusion Detection Systems of Large-scale Industrial CPS

16:20 Pavel Andreev, Vladislav Ananev, Aram Avetisyan, Vladimir Makarov, Vadim Gliner, Assaf Schuster (Computer Science Department, Technion-IIT, Haifa, Israel), Evgeny Karpulevich (ISP RAS)
Non-architectural improvements for ECG classification using deep neural network

16:40 Mariia Akimenkova (ISP RAS), Anna Maznina (MIPT), Anton Naumov, Evgeny Karpulevich (ISP RAS)
Application of HDBSCAN method for clustering scRNA-seq data

OPEN SOURCE SOFTWARE IN CONTINUUM MECHANICS PROBLEMS SOLVING

The scientific tracks will be held online at online.isprasopen.ru

10:00 Alexander Petrov PhD (Chief Researcher, professor at IpMech RAS)
On superconvergent numerical schemes based on boundary element method

10:50 Igor Petrov, Dr.Sci, (MIPT)
Exploring the Arctic

11:40 Participant introduction for the poster session

12:00 Victoria Korchagova (ISP RAS)
On Implementation of Discontinuous Galerkin Scheme for Gas Dynamics Problems Using Open-Source Software

12:20 Anatoly Ryabinin, Alexander Kuzmin (Department of Hydroaeromechanics Saint Petersburg University)
Transonic flow simulation in a bent channel using SU2 softwar

12:40 Poster session and lunch

14:00 Matvey Kraposhin PhD (ISP RAS)
QGDsolver: open-source framework for development of gas and liquid models based on regularized equation

14:20 Dmitrii Golovin (VNIIFTRI)
Simulation of infrasonic pistonphone

14:40 Andrey Epikhin PhD (ISP RAS)
Numerical modelling of highly underexpanded underexpanded jet impingement on a flat plate

15:00 Ivan Shirokov (MSU)
Method for accurate gridding for modelling of external flows

15:40 Break

16:00 Viktor Ignatenko and Denis Bazarevskiy (STR-Soft)
Experience of Substitution of Commercial CAD, CAE Software Components with Freeware Analogue

16:20 Ilya Evdokimov and Susann Hänsch (The Helmholtz-Zentrum Dresden-Rossendorf)
Scalable Workflows for OpenFOAM Evaluation

15:20 Kirill Vatutin, Andrey Epikhin PhD, Matvey Kraposhin PhD (ISP RAS)
Sonic boom prediction in far field for supersonic vehicles via open-source software

16:40 Maria Komarova, Vladimir Zenkin and Maxim Kulabukhov (The Bauman Moscow State Technical University)
Multicriteria optimization of the diesel engine piston cooling gallery

17:00 Daria Romanova (ISP RAS)
Comparison of Single Velocity and Multi Velocity Multiphase Models for Slope Flow Simulations

TECHNOLOGIES OF PROGRAM ANALYSIS, MODELING AND TRANSFORMATION

The scientific tracks will be held online at online.isprasopen.ru

10:30 Vladimir Gratinskiy, Evgeny Novikov PhD, Ilya Zakharov PhD (ISP RAS)
Expert Assessment of Verification Tool Results

10:55 Denis Straghkov (ISP RAS)
Methods and software tools which allow emulating UEFI modules

11:20 M.N. Goryunov, A.G. Mackevich, D.A. Rybolovlev (Russian Federation Security Guard Service Federal Academy)
Synthesis of a machine learning model for detecting computer attacks based on the CICIDS2017 dataset

11:45 Alexey Vishnyakov, Andrey Fedotov PhD, Daniil Kuts, Alexander Novikov, Darya Parygina, Eli Kobrin, Vlada Logunova, Pavel Belecky and Shamil Kurmangaleev PhD (ISP RAS)
Sydr: Cutting Edge Dynamic Symbolic Execution

12:10 Vahagn Vardanyan PhD, Sevak Sargsyan PhD , Hayk Aslanyan PhD, Mariam Harutunyan, Matevos Mehrabyan, Karen Sargsyan, Hripsime Hovhannisyan, Hovhannes Movsisyan, Jivan Hakobyan (Russian-Armenian Slavonic University Yerevan, Armenia), Shamil Kurmangaleev PhD (ISP RAS)
GENES ISP, a code analysis platform

12:35 Ekaterina Lavrischeva Dr.Sc. (ISP RAS)
Modeling Technical and Mathematical Problems in Applied Knowledge Areas

13:00 Break (lunch)

14:00 Mikhail Solovyev PhD, Maksim Bakulin, Sergey Makarov, Dmitry Manushin, Vartan Padaryan PhD (ISP RAS)
Practical abstract interpretation of binary code

14:25 Sergey Kozlov PhD, Sergey Kopylov, (Russian Federation Security Guard Service Federal Academy), Boris Kondrat'ev (The Ministry of Defence of the Russian Federation), Dmitry Obydenkov (ISP RAS)
Implementing watermarking based on a virtual XPS printer for Windows operating systems

14:50 Maksim Mishechkin, Shamil Kurmangaleev PhD , Vitaly Akolzin (ISP RAS)
Architecture and functionality of the ISP Fuzzer

15:15 Shamil Kurmangaleev PhD , Vitaly Akolzin, Maksim Mishechkin (ISP RAS)
Development of an effective method for fuzzing applications with complex data formats

15:40 Break

16:00 Thien Tran, Shamil Kurmangaleev PhD (ISP RAS)
Automated generation of fuzzing test

16:25 Sergey Zelenov PhD , Ekaterina Lavrischeva Dr.Sc. (ISP RAS)
Model-Based Approach for Ensuring Reliability and Security of Web Services

DECEMBER 11TH
12:40–14:00

OPEN SOURCE SOFTWARE IN CONTINUUM MECHANICS PROBLEMS SOLV

Poster session online.isprasopen.ru
Participant introduction: 11:40–12:00

12:40 Artem Vodeniktov (KSPEU) and Valeriia Melnikova (ISP RAS)
Investigating the Flow Conditioners Working Regimes Efficiency Using Numerical Simulation

12:40 Michael Ermakov PhD (ISP RAS)
Mesh generation via open-source code Gmsh

12:40 Mikhail Levin, Alexander Ivanov, Tatiana Stenina and Sergey Strijhak PhD (ISP RAS)
Toward to usage of regularized Stefan problem solution in icing modeling

12:40 Albina Gizzatullina (Kalashnikov ISTU), Maria Koroleva (UdFRC UB RAS), Olga Mishchenkova and Alena Chernova (Kalashnikov ISTUv)
Numerical investigation of cooling down and aerodynamic resistance processes in ribbed tubular elements

13:00 Matvey Kraposhin PhD (ISP RAS)
Open source software as a foundation for constructing integrated digital models of engineering systems

13:00 Vladimir Sudakov PhD and Vladimir Osipov (Keldysh Institute of Applied Mathematics, RAS)
The Fuzzy Origin–Destination Matrix Estimation for Planning Air Traffic

13:00 Daria Romanova, Sergei Strijhak PhD, Kraposhin Matvey PhD (ISP RAS)
Development of snowYadeFoam solver for snow particles simulation

13:00 Maria Kiryushina and Tatiana Elizarova PhD (Keldysh Institute of Applied Mathematics, RAS)
Simulation of nozzle start-up process and jet flow to low pressure area

13:20 Ilias Sibgatullin PhD (Shirshov Institute of Oceanology of RAS), Daniil Riazanov (ISP RAS), Kraposhin Matvey PhD (ISP RAS), Evgeny Ermaniuk PhD (Lavrentyev Institute of Hydrodynamics of the Siberian Branch of RAS)
Direct numerical simulation of internal wave attractors in stratified and/or rotating fluids

13:20 Mikhail Zaitsev (IBRAE RAS)
Usage of CABARET method for triangular flat cells

13:20 Bulat Kashfutdinov (ISP RAS)
Analysis of natural frequencies of reservoir filled with liquid at different levels using the open-source software Code_Aster

IVANNIKOV ISP RAS OPEN CONFERENC
10–11.12.2020

IVANNIKOV INSTITUTE FOR SYSTEM PROGRAMMING OF THE RAS

ISP RAS

This year the Conference is devoted to the 80th anniversary of Academician Victor Ivannikov, ISP RAS founder and first director.