Information and Computing Infrastructure of JINR

Theme leader: V.V. Korenkov
Deputy: T.A. Strizh

Participating Countries and International organizations:

Armenia, Azerbaijan, Belarus, Bulgaria, CERN, China, Czech Republic, Egypt, France, Georgia, Germany, Italy, Kazakhstan, Moldova, Mongolia, Poland, Romania, Russia, Serbia, Slovakia, South Africa, Sweden, Taiwan, Ukraine, USA.

Issues addressed and main goals of research:

The purpose of the theme is to develop the network, information and computing infrastructure of JINR for the research and production activities of the Institute and its Member States on the basis of state-of-the-art information technologies in accordance with the Seven-Year Plan for the development of JINR. A particular direction within the theme is the development of the JINR MLIT Multifunctional Information and Computing Complex (MICC) presented as a Project.

Expected results in the current year:

1. Provision of the stable, safe and integral functioning of the JINR information and telecommunication network (backbone network (2x100 Gbps); transport network of the NICA megaproject (8x100 Gbps); MLIT mesh network (100 Gbps); backbone external telecommunication channels (3x100 Gbps); Wi-Fi network at the Institute's sites.

   Provision of the full-scale and optimal operation of the guaranteed power supply and climate control systems of the MICC computing infrastructure. Commissioning of a new fire safety system of the MICC infrastructure.

   Expansion of the performance and storage system of the MICC basic components, i.e., Tier1 center at JINR, Tier2/CICC, EOS system. Support and maintenance of user work with the EOS system. Development of the system of access to the home directories of JINR users (AFS), of the unified storage and access system for the MICC common software (CVMFS), transition to a new software system for working with tape robots (CTA). Creation and update of a polygon for debugging and testing new software for the uppermost components of the MICC.

   Extension of the computing capacities of the cloud service for scientific and engineering computing due to integration with some cloud infrastructures of institutes of the Russian Federation collaborating with JINR and of other JINR Member States. Expansion of the number of users and participants of the DICE on the basis of the cloud resources of the JINR Member States' organizations. Enlargement of the resources of the MICC cloud, including at the expense of the resources acquired by the Baikal-GVD, JUNO, NOvA/DUNE experiments, and their maintenance.

   Development of low-level software for automating the process of data transfer both between the layers of the hierarchical data processing and storage system of the "Govorun" supercomputer and between computing sites included in the distributed environment to model and reconstruct events for the NICA experiments.

   Support and maintenance of the operation of the WLCG virtual organizations, the NICA, COMPASS, NOvA, ILC and other experiments, local user groups on the MICC Tier1 and Tier2 resources.

   Putting into trial operation and development of SPD experiment systems for: management of processing physical events mass simulation data; data management implementing the model and policy of working with them; data processing infrastructure monitoring. Connection to the load management system of the computing resources of the SPD collaboration: PNPI, St. Petersburg State University, Samara University, SPD Online Filter (prototype).

   Expansion of the DIRAC-based distributed information and computing platform. Integration of new computing and storage resources.

   Development and support of the current MICC monitoring and accounting system, inclusion of monitoring the parameters of new computing and engineering elements in the list of monitored services and hardware.

Creation of a prototype of an integrated system for monitoring and managing the MICC services and hardware on the basis of new technological approaches, including Big Data analytics. Deployment of the prototype of a Big Data user infrastructure to solve JINR's urgent tasks.

2. Development and maintenance of the systems EDS "Dubna", APT EVM for NICA, ADB2, ISS, HR LHEP, CERNDB, EDS "Advance reports", JINRex at the request of end users. Development and commissioning of a new version of the PIN system. Maintenance of the JINR Information System for Scientific Certification (ISSC) and "Document Base". Transition of the functionality of the "Document Base" system into the EDS "Dubna". Trial operation of the localized server of scientific publications based on the Invenio-JOIN2 software program, provision of interaction with the PIN IS at the level of bibliographic metadata.

Transition of the "Dubna" program library to double precision and inclusion of the programs in the JINRLIB mathematical program library.

Modernization of the information and software support of central information servers, portals and databases to ensure the MLIT and JINR activities: maintenance and update of the MLIT portals, of the website of the JINR PEPAN and "PEPAN Letters" journals on top of the Open Journal Systems (OJS) software for managing the editorial process, of the websites "JINR Dissertation Councils", INDICO, "JINR Photo Archive", "Special Assessment of Working Conditions (SAWC)-Expert", etc. Creation and support of websites, including in hosting mode, at the request of the Institute's structural subdivisions.

Commissioning and further development of user services of the web-based information and analytical system for managing network and other types of software licenses at MLIT.

Implementation of the hierarchical data processing and storage system in the information and computing system for radiobiological research to accelerate experimental data processing, development of web services to ensure convenient user work with the results of data analysis.

Trial operation of the "Personal Account" system of the account management service.

Development of the concept and creation of the technological basis for the "JINR Digital Ecosystem" platform. Integration of several services of the corporate information system that are functioning at JINR into the platform.

3. Holding of special courses related to data processing and analysis for megascience experiments, including the NICA project. Organization of tutorials on solving applied tasks on the basis of machine and deep learning methods, including in the JINR Member States in accordance with international cooperation programs.

Development of a polygon for intelligent cognitive robots and holding of laboratory workshops on robotics.

List of projects

Project	Leader	Priority (period of realisation)
1. MICC	V.V. Korenkov	1 (2017-2023)

List of Activities

Activity or Experiment	Leaders
Laboratory or other Division of JINR	Main researchers
1. MICC Project	**V.V. Korenkov**
	A.G. Dolbilov
	V.V. Mitsyn
	T.A. Strizh
MLIT	K.N. Angelov, A.I. Balandin, N.A. Balashov, A.V. Baranov, S.D. Belov, D.V. Belyakov, A.S. Bondyakov, Yu.A. Butenko, A.I. Churin, S.V. Chashchin, A.V. Evlanov, S.V. Gavrilov, A.P. Gavrish, T.M. Goloskokova, A.O. Golunov, E.N. Grafova, Eu.A. Grafov, N.I. Gromova, A.E. Gushchin, I.S. Kadochnikov, I.I. Kalagin, A.S. Kamensky, I.A. Kashunin, A.O. Kondratiev, G.A. Korobova, E.Yu. Kulpin, N.A. Kutovskiy, A.A. Lavrentiev,

		A.N. Mahalkin, S.B. Marchenko, M.A. Matveev, Ye. Mazhitova, S.V. Mitsyn, A.V. Nechaevsky, D.A. Oleynik, G.A. Ososkov, I.S. Pelevanyuk, A.Sh. Petrosyan, M.S. Plyashkevich, D.V. Podgainy, L.A. Popov, D.I. Pryakhina, Ya.I. Rozenberg, T.F. Sapozhnikova, R.N. Semenov, M.L. Shishmakov, I.A. Sokolov, O.I. Streltsova, V.V. Trofimov, A.V. Uzhinskiy, N.N. Voitishin, A.S. Vorontsov, A.Yu. Zakomoldin, P.V. Zrelov, M.I. Zuev
	VBLHEP	K.V. Gertsenberger, Yu.P. Minaev, A.N. Moshkin, O.V. Rogachevsky, I.P. Slepov, S.V. Shmatov
	FLNP	G.A. Sukhomlinov
	LRB	V.N. Chausov
	FLNR	A.S. Baginyan, A.G. Polyakov, V.V. Sorokoumov
	DLNP	Yu.P. Ivanov, V.A. Kapitonov, A.S. Zhemchugov
	BLTP	A.A. Sazonov
	UC	I.N. Semeniushkin
2.	**Information and software support of the research-and-production activity at JINR**	**P.V. Zrelov** **V.V. Korenkov** **I.A. Filozova** **S.D. Belov**
	MLIT	Eu.I. Aleksandrov, I.N. Aleksandrov, N.A. Balashov, D.V. Belyakov, O.V. Belyakova, N.E. Belyakova, V.F. Borisovsky, Yu. A. Butenko, N.A. Davyudova, T.M. Goloskokova, D.S. Golub, A.V. Ilina, P. Jancik, L.A. Kalmykova, A.A. Karlov, D.I. Karpova, D.V. Kekelidze, S.A. Kretova, L.D. Kuchugurnaya, S.V. Kunyaev, N.A. Kutovskiy, A.Yu. Lebedev, M.A. Lubimova, M.S. Plyashkevich, L.V. Popkova, A.V. Prikhodko, V.M. Pushkina, A.M. Raportirenko, T.F. Sapozhnikova, S.V. Semashko, R.N. Semenov, G.V. Shestakova, O.I. Streltsova, T.S. Syresina, T.V. Tyupikova, A.V. Uzhinskiy, D.Yu. Usov, N.N. Vorobieva, V.M. Yagafarova, A.V. Yakovlev, A.G. Zaikina, T.N. Zaikina, M.I. Zuev
	FLNP	W. Badawy, A. Yu. Dmitriev, M.V. Frontasyeva, I. Pavliková
	LRB	I.A. Kolesnikova, M.G. Lalkovicova
	DSOA	S.N. Nedelko
3.	**Development of the system for training and retraining of IT specialists based on the JINR MICC and its educational components**	**V.V. Korenkov** **T.A. Strizh** **O.I. Streltsova**
	MLIT	N.A. Balashov, S.D. Belov, V.V. Galaktionov, T.M. Goloskokova, N.I. Gromova, O.V. Ivantsova, I.S. Kadochnikov, M.H. Kirakosyan, N.A. Kutovskiy, Ye. Mazhitova, V.V. Mitsyn, S.V. Mitsyn, I.K. Nekrasova, A.V. Nechaevsky, D.A. Oleynik, A.Sh. Petrosyan, D.V. Podgainy, A.G. Reshetnikov, T.F. Sapozhnikova, R.N. Semenov, Sh.G. Torosyan,V.V. Trofimov, S.V. Ulyanov, A.V. Uzhinskiy, M.I. Zuev
	UC	A.Yu. Verkheev

Collaboration

Country or International Organization	City	Institute or Laboratory
Armenia	Yerevan	IIAP NAS RA
Azerbaijan	Baku	ADA
		IP ANAS
Belarus	Minsk	BSTU
		INP BSU
		JIPNR-Sosny NASB
		UIIP NASB
Bulgaria	Sofia	INRNE BAS
		SU
CERN	Geneva	CERN
China	Beijing	IHEP CAS
Czech Republic	Ostrava	VSB-TUO
	Prague	IP CAS
Egypt	Cairo	ASRT
	Giza	CU
France	Marseille	CPPM
Georgia	Tbilisi	GRENA
		GTU
		TSU
Germany	Darmstadt	GSI
	Frankfurt/Main	Univ.
	Hamburg	DESY
	Karlsruhe	KIT
	Zeuthen	DESY
Italy	Bologna	INFN
Kazakhstan	Almaty	INP
	Astana	BA INP
Moldova	Chisinau	IMCS
		MSU
		RENAM
Mongolia	Ulaanbaatar	NUM
Poland	Warsaw	IMGW-PIB
Romania	Cluj-Napoca	INCDTIM
Russia	Chernogolovka	LITP RAS
		SCC IPCP RAS
	Dubna	Dubna State Univ.
		SCC "Dubna"
		SEZ "Dubna"
	Gatchina	NRC KI PNPI
	Moscow	FRC IM RAS
		IITP RAS
		ISP RAS
		ITEP
		KIAM RAS
		MPEI
		MSK-IX
		MSU
		NRC KI
		PRUE

		RCC MSU
		RSCC
		SINP MSU
	Moscow, Troitsk	INR RAS
	Novosibirsk	BINP SB RAS
		ICMMG SB RAS
		SKIF
	Pereslavl-Zalesskiy	PSI RAS
	Protvino	IHEP
	Puschino	IMPB RAS
	Samara	SU
	St. Petersburg	FIP
		ITMO Univ.
		SPbSPU
		SPbSU
	Vladikavkaz	NOSU
Serbia	Belgrade	Univ.
Slovakia	Kosice	IEP SAS
	Presov	PU
South Africa	Cape Town	UCT
Sweden	Lund	LU
Taiwan	Taipei	ASGCCA
Ukraine	Kharkov	NSC KIPT
	Kiev	BITP NASU
USA	Arlington, TX	UTA
	Batavia, IL	Fermilab
	Upton, NY	BNL