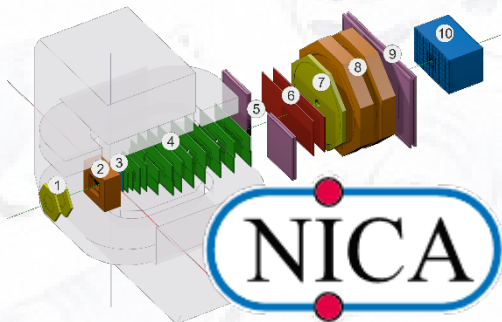


Status of the Configuration Information System for BM@N online processing

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9th Collaboration Meeting of the BM@N
Experiment at the NICA Facility, 13-16
September 2022



Joint Institute for Nuclear Research

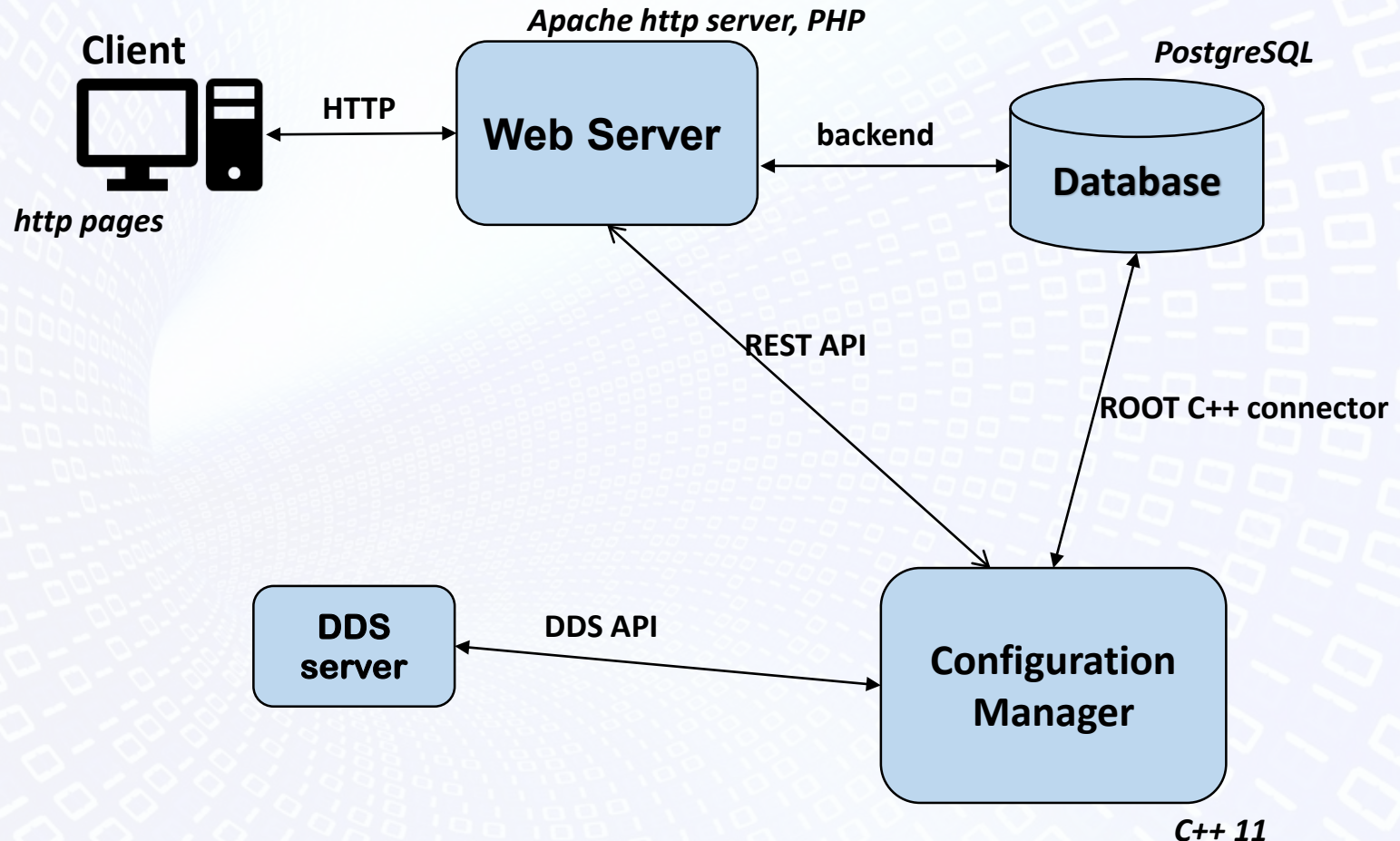
Outline

- **Goals of the system**
- **General Architecture of the BM@N Configuration System**
- **DB Object model**
- **WEB interface: Configuration Manager view, monitoring, add/edit task views**
- **Configuration Manager: functionality**
- **Configuration Manager: implementation**
- **Configuration Manager: task states**
- **Configuration Manager: implementation structure**
- **Use of the Dynamic Deployment System (FAIR)**
- **Test environment**
- **Status**
- **Next steps**

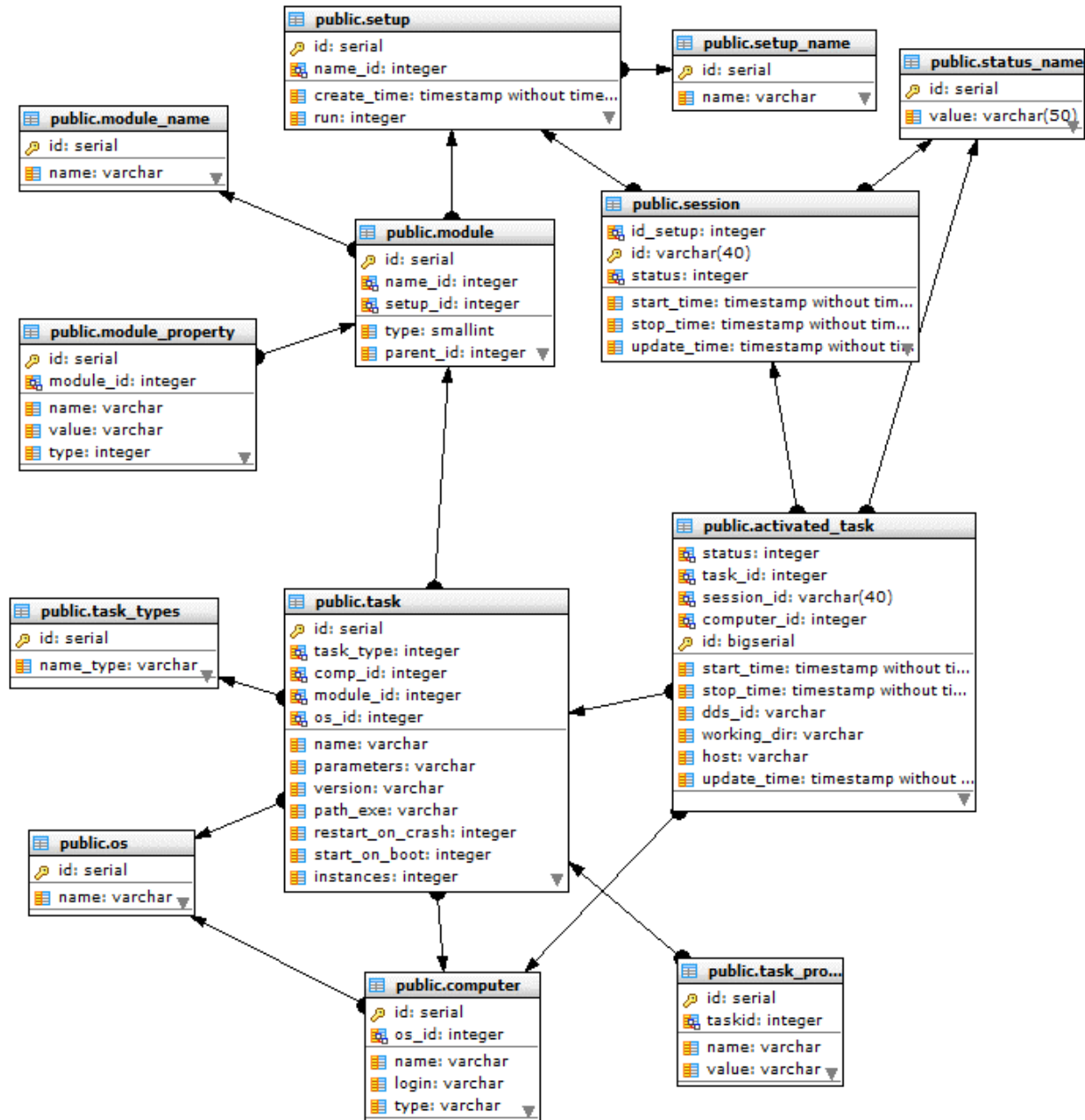
Goals of system

- **store and provide configuration data for online processing :**
 - **set of various detectors configuration parameters (working voltage etc.)**
 - **sequences of software tasks with their dependencies**
 - online raw data digitization
 - online histogramming
 - fast event reconstruction
 - event monitor
 - **setup and tasks dependencies**
- **should to be able to start, stop and monitor setup tasks during experiment sessions**

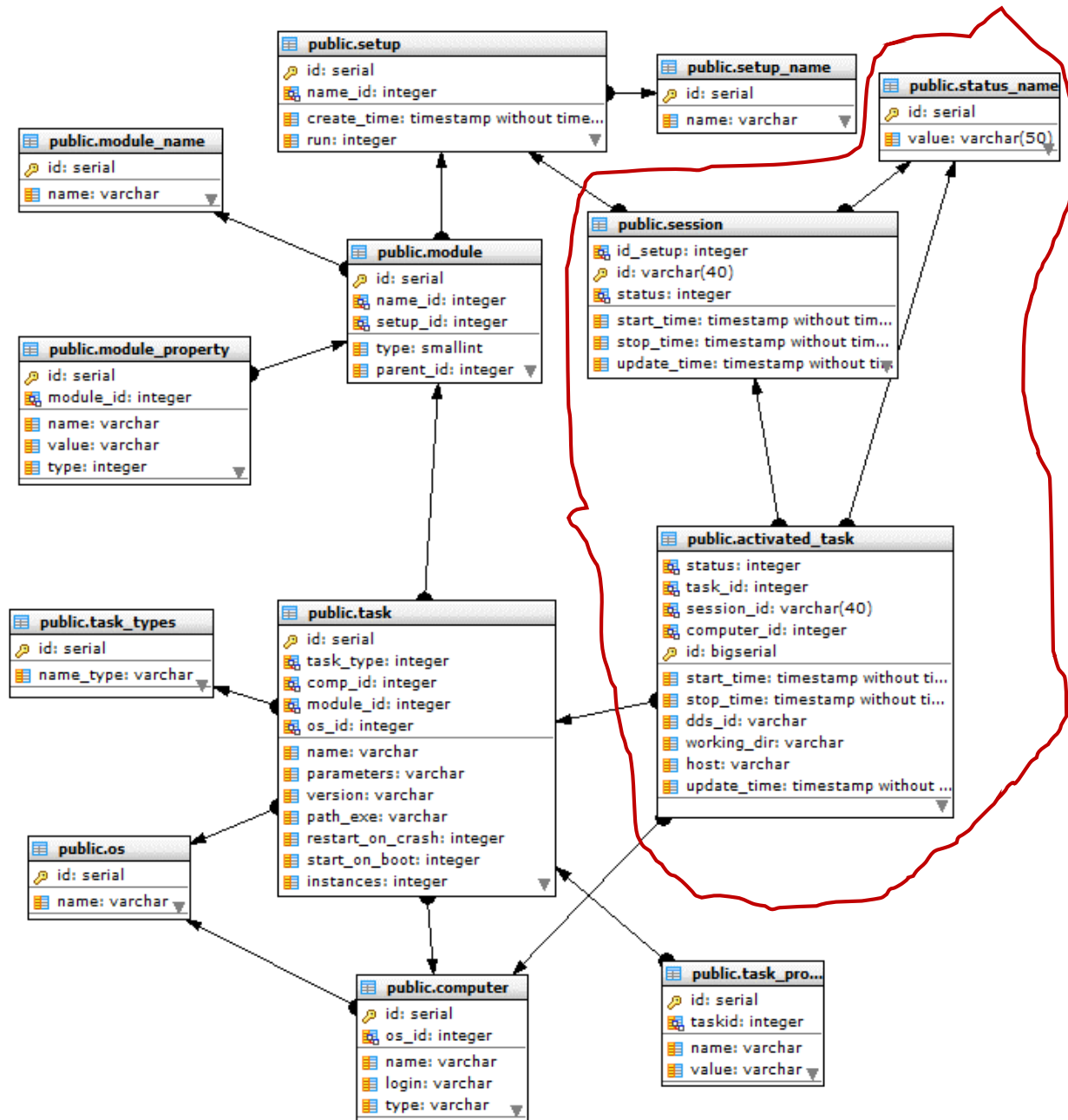
General Architecture of the BM@N Configuration System



DB Object model



DB Object model



Web-interface. Configuration Manager view

Menu

TASK MONITOR

CONFIGURATION MANAGER

DICTIONARY SET ▼

Get in touch

✉ [Konstantin Gertsenberger](#)

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Configuration Manager

Select Setup Run: BMN Run 7 +

Control panel START STOP

[ADD SETUP MODULE](#)

Module Name	Working Directory	Actions		
OnlineControl				

[Module Tasks](#) [Module Properties](#) [ADD MODULE TASK](#)

Task Name	Host	Actions		
bm_n_event_display_imit	[a-z]*[0-9]*[.]jinr[.]ru			
bm_n_fast_event_reco_imit	[a-z]*[0-9]*[.]jinr[.]ru			
bm_n_online_histo_imit	[a-z]*[0-9]*[.]jinr[.]ru			
bm_n_root_digi_imit	[a-z]*[0-9]*[.]jinr[.]ru			

Web-interface. Monitoring view



Menu

TASK MONITOR

CONFIGURATION MANAGER

DICTIONARY SET

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Task Monitor

Select task ▼ Select setup ▼ Select module ▼ Stopped ▼ Select host ▼ [FILTER](#) [RESET](#)

Task Name	Setup:Run	Module	Status	Log	Start Time	End Time	Host
bm_n_root_digi_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bm_n_fast_event_reco_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bm_n_online_histo_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bm_n_event_display_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bm_n_fast_event_reco_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:53:21	2022-08-20 21:11:02	
bm_n_event_display_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:53:21	2022-08-20 21:11:02	
bm_n_online_histo_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:53:21	2022-08-20 21:11:02	
bm_n_root_digi_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:53:21	2022-08-20 21:11:02	
bm_n_online_histo_imit	BMN:7	OnlineControl	Stopped		2022-08-20 22:20:03	2022-08-20 22:21:04	
bm_n_fast_event_reco_imit	BMN:7	OnlineControl	Stopped		2022-08-20 22:20:03	2022-08-20 22:21:04	
bm_n_root_digi_imit	BMN:7	OnlineControl	Stopped		2022-08-20 22:20:03	2022-08-20 22:21:04	


Web-interface. Monitoring view (2)

**Baryonic Matter
at Nuclotron**

Menu


TASK MONITOR

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 **BM@N** Configuration DataBase LOGIN

Task Monitor

Select task ▼





Select setup ▼

Select module ▼

Select status ▼

Select host ▼

FILTER RESET

Task Name	Setup:Run	Module	Status	Log	Start Time	End Time	Host
bmn_root_digi_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bmn_fast_event_reco_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
bmn_online_histo_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	
<div>Task Type: exe Path: /usr/local/bmn_config/bmn_online_histo_imit Parameters: --time 5 --messageFile bmn_online_histo_imit_message.txt Version: version1 Instance: 1 OS: centos Restart: yes Boot: yes Properties: Name DigiMessProperty; Value read;</div>							
bmn_event_display_imit	BMN:7	OnlineControl	Stopped		2022-08-20 19:52:06	2022-08-20 19:52:20	

Web-interface. Add task view


Menu

TASK MONITOR

CONFIGURATION MANAGER

DICTIONARY SET

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Add Task for **OnlineControl** Module

Task Name*	<input type="text"/>
Host*	Select Host Name
Task Type*	Select Task Type
Path*	<input type="text"/>
Parameters*	<input type="text"/>
Version*	<input type="text"/>
Instance*	<input type="text"/>
OS*	Select OS after Host Name
Restart*	<input checked="" type="radio"/> Yes <input type="radio"/> No
Boot*	<input checked="" type="radio"/> Yes <input type="radio"/> No
Properties	Task Properties can be added or edited only in the Task Editing Mode

SAVE

CANCEL

Web-interface. Task edit mode



Menu

TASK MONITOR

CONFIGURATION MANAGER

DICTIONARY SET

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Edit Task for [OnlineControl](#) Module

Task Name*	bm_n_root_digi_init						
Host*	[a-z]*[0-9]*[.]jinr[.]ru						
Task Type*	exe						
Path*	/usr/local/bm_n_config/bm_n_root_digi_init						
Parameters*	--time 5 --timeSleep 10 --messageFile bm_n_root_digi_init_message.txt						
Version*	version1						
Instance*	1						
OS*	centos						
Restart*	<input checked="" type="radio"/> Yes <input type="radio"/> No						
Boot*	<input checked="" type="radio"/> Yes <input type="radio"/> No						
Properties	<div>ADD TASK PROPERTY</div> <table><thead><tr><th>Property Name</th><th>Value</th><th>Actions</th></tr></thead><tbody><tr><td>DigiMessProperty</td><td>write</td><td> </td></tr></tbody></table>	Property Name	Value	Actions	DigiMessProperty	write	
Property Name	Value	Actions					
DigiMessProperty	write						

SAVE

CANCEL

Configuration Manager functionality

- listens and performs commands (REST API in use)
 - Start all setup tasks
 - Stop all setup tasks
 - Update setup
 - Get log of the activated task
 - Check if configuration manager is alive
 - Stop configuration manager
- reads from DB setup data using setup ID
- prepares tasks for start using DDS system (convert data into DDS topology form)
- starts all tasks of topology using DDS
- gets from DDS server info about all started tasks
- stores in the DB the info about DDS session and tasks

Configuration Manager implementation

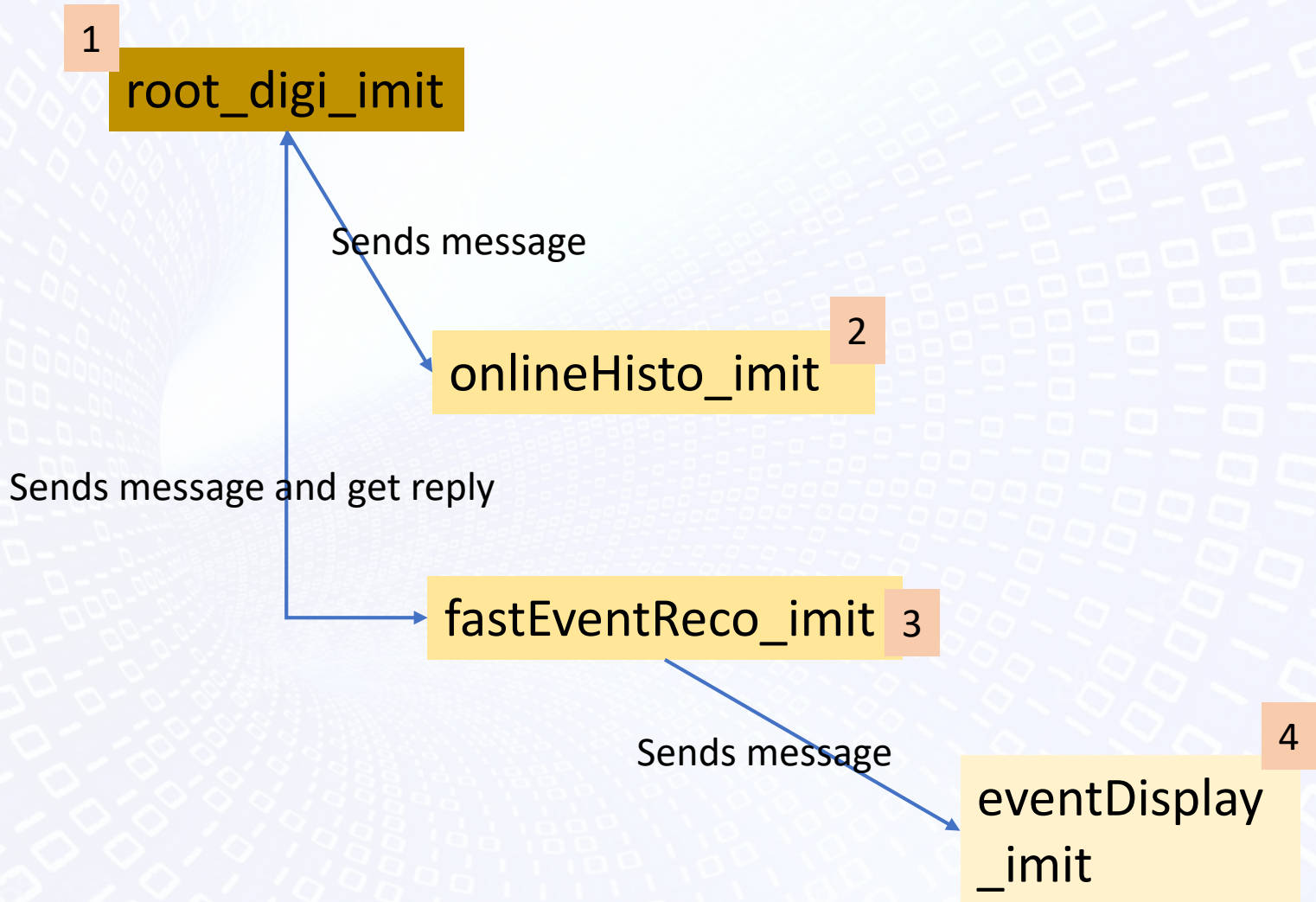
- **class ConfigSupport**
 - performs operations that connected with database
 - loads from DB the setup by setup id and keeps these data in memory during manager run
 - writes into DB all dynamic data concerning DDS sessions and activated tasks
 - converts DB setup data into DDS topology
- **class DDSCommunicator**
 - performs all operations that connected with DDS facilities
 - creates, starts, updates and stops DDS session.
 - gets info about DDS tasks using callbacks
 - gets task log stream
- **class RestService**
 - Performs all operations that connected with REST API
 - listens socket, gets and parses requests, performs requests using ConfigSupport and DDSCommunicator

Configuration Manager: states

- **States of the setup and its tasks**
 - **Starting**
 - Configuration Manager (ConfigMan) got command to start setup, activated the command and have sent response to sender
 - **Started**
 - ConfigMan got response from DDS server that task was started and updated database with this info.
 - **Stopping**
 - ConfigMan got command to stop setup, activated this operation and have sent response to sender
 - **Stopped**
 - ConfigMan got response from DDS server that task is stopped and updated database with this info

Test environment

Configuration manager uses test_topology.xml and starts:



Use the Dynamic Deployment System for tasks management

- **DDS: tool-set that automates and significantly simplifies a deployment of user defined processes (tasks) and their dependencies**
- **DDS: deploys agents to execute user tasks**
- **DDS agent:**
 - supports multiple tasks slots
 - is able to run and watchdog multiple tasks simultaneously
- **Some of DDS features did not work as described**
 - used less convenient methods
 - SSlotInfoRequest instead of SOnTaskDoneRequest

Status

- **Design is developed**
- **Beta version of system with all requested functionality is implemented and put in Gitlab**
 - **Database in PostgreSQL: done**
 - **WEB interface: done**
 - **Configuration Manager (C++ library and config_manager executable): done**
- **Test environment is used for tests**

Next steps

- **Web interface improvement**
 - Add tab for DDS sessions
 - Improve Control panel of Configuration Manager view on the base of test results (control panel states)
- **Produce intensive tests of full system**
- **Make updates on the base of the test results for all three components (DB, Web interface and Configuration manager)**
- **Add real tasks of online processing and use it in tests**
- **Try to optimize interactions with DDS**

The work was funded by the Russian Foundation for Basic Research (RFBR) grant under the research project 18-02-40125