

INAF SCIENCE GATEWAY FOR SECOND SKA SCIENCE DATA CHALLENGE Franco Tinarelli INAF-IRA



INAF SCIENCE GATEWAY

SECOND SKA SCIENCE DATA CHALLENGE. The latest challenge will see participants analyse a simulated datacube 1 TB in size, in order to find and characterise the neutral hydrogen content of galaxies across a sky area of 20 square degrees.



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The Science Gateway is a web application developed in PHP;

Set of a web server, virtual host and virtual machine with functions dedicated to authentication, authorization, connection and display;

Interface to the Computing Systems used to process the data cube of the Second SKA Science Data Challenge: three virtual machines and an HPC cluster;

The Apache web server is hosted by a work station with CentOS 7 operating system;

The Virtual Host https://src-sg.inaf.it manages the user interface, the communication with the RAP Authentication Virtual Machine (developed by Franco Tinarelli), the GMS authorization Virtual Machine (developed by Sonia Zorba) and with the Remote Desktop Gateway Apache Guacamole;

Manages the assignment of the Computing Systems to the registered groups: Three VMs with Debian 10 operating system with 8 Cores and 128 Gb of RAM, hosted by a workstation with Debian 10 operating system located at the Institute of Radio Astronomy;

An HPC computing server located at the Trieste Astronomical Observatory, which offers computing resources equivalent to VMs;

Uses OpenID Connect and JWT Tokens to exchange information between Virtual Host and Virtual Machine.



INAF SCIENCE GATEWAY: WEB APPLICATION FOR SECOND SKA SCIENCE DATA CHALLENGE



Blue arrows indicate that the application is internal to the web server.

Red arrows indicate an external application.

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Setup WS to receive the account to access the virtual machine or cluster resources.

guacamole to login into the VM with ssh, VNC or RDP web apps.

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rosetta to use the rosetta platform for cluster visualization task or interactive jobs.

Call GMS to add registered users to working groups. (PI only)

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LOGIN WITH Google: franco.tinarelli@inaf.it is member of group: skadc03
You can connect to ska-vm03.ira.inaf.it to process the data cube.Perform one of the following:
○ Receive Username and Password.
O Send yours ssh pubblic key to connect from the terminal without using the password.
\bigcirc Create an ssh key pair, if you don't have one, and send the public key.
Send
Exit



INAF SCIENCE GATEWAY: OpenID Connect and OAuth2



- 1 SG call RAP by sending **client_id**, **redirect_uri**, **state**, **scope** (openid email profile) and requesting **code**;
- 2 RAP compares **client_id** and **redirect_uri**, if correct opens the application to authenticate the user. The user logs in with eduGAIN (IA2 SAML Server), or with social identity providers using OpenID connect and Oauth2. RAP records user data in its DB.
- 3 RAP call GMS by sending user email, if the user exists GMS return the user group. RAP records user group in its DB.
- 4 RAP return to SG, using the **redirect_uri**, the **code** requested and the **status** for the security check.
- 5 SG call RAP by sending client_id, redirect_uri, state, code and secret, requesting the Access Token.
- 6 RAP return to SG the Access Token in json format. The json include the Access Token, the Expiration Date and the state. RAP record the token in its DB.
- 7 SG call RAP sending Access Token and requesting User Information.
- 8 RAP return to SG the JWT Token (signed and encrypted) which contains the user information in its payload. SG record the user infomation.



INAF SCIENCE GATEWAY: Call RAP for the first registration of the team manager







After logging into the GMS, you will see the group that you can manage to add or delete the people who will work with you.



When you log into the portal for the first time and you are not a Team Manager, you are notified to ask your PI to join the work group.

When your email is added to the group you will be able to take advantage of all the connection and calculation services offered by the science gateway.



Remote Authentication Portal

INAF SCIENCE GATEWAY: Setup VM and receive the credentials

In order to access the VM of the group you need to setup an account. The operation creates a username and password that will allow you to use an SSH connection from a terminal, a desktop with X2Go and will insert you in the Guacamole DB to use connections from the terminal and graphics, using a web browser with a PC, a tablet or a smartphone.



The information regarding your username and password will be shown to you on a secure page by following the link that will be sent to you via email.



If your group belongs to a clustered computing resource, your username will become the name of the group and access will be granted through the key pair. If you don't have the key pair, the application can generate them and send them to you.



INAF SCIENCE GATEWAY: Computing Resources



SG uses tokens to inject user accounts into virtual machines; use PHP ssh2 to inject the public key into the user file ~/ssh/authorized_keys





- Once the access credentials to the virtual machine assigned to the group have been obtained, it will be possible to log in with a terminal session or create an X2Go session for the use of graphics.
- The connection speed to the VM is one Giga bit, the connection with the storage via NFS (Lustre) is ten Giga bit.
- Each VM accesses a large collection of software (setup-help in the terminal).
- Access to data and collection of software is read-only and limited to the local network.
- Each group can install their own software on a shared disk.



You are a team manager, select the type of workspace for your group

sources with SSH and rosett

Exit

Use Virtual Machine with SSH, guacamole and X2Go

INAF SCIENCE GATEWAY LOGIN WITH Google: franco.tinarelli@inaf.i

Save

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INAF SCIENCE GATEWAY: Login to VM with key-pairs

••• Titnarel - franco.tinarelli1@ska-vm03:~- ssh franco.tinarelli1@ska-vm03.ira.inaf.it - 80×29 ftinarel@mambo ~ % ssh franco.tinarelli1@ska-vm03.ira.inaf.it Linux ska-vm03 4.19.0-13-amd64 #1 SMP Debian 4.19.160-2 (2020-11-28) x86_64

Exit

The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright.

Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent permitted by applicable law. Last login: Wed May 11 15:43:08 2022 from 192.167.165.209 [irasoft] run setup-help for setup info. franco.tinarelli1@ska-vm03:~\$ As for access to the computing cluster, you can register your public key to access to VMs without using the password.

For VMs the username remains the one assigned.

The public key is registered in the DB that contains the user information.

The public key will be replaced only if different from the registered one.

The web application uses MariaDB to record user information, Manager information and user configurations of Guacamole.



INAF SCIENCE GATEWAY: Login to VM with Guacamole SSH (>_ ska-vm03-13)

By logging into Apache Guacamole you will find the connections that the Science **Remote Authentication Portal** Gateway generated for you when you registered. Exit 🛠 edu GAIN ④ ① + 品 ⇒ Local Login • • • • · < > D 90 C ska01.ira.inaf.it Use the eduGAIN Logo to Login or Register to the RAP facility if you belong to an eduGAIN ldp. Use these to the R ශාද ④ ① + ः inux ska-vm03 4.19.0-13-amd64 #1 SMP Debian 4.19.160-2 (2020-11-28) x86 64. 🗎 ska01.ira.inaf.it identity RECENT CONNECTIONS 💄 franco.tinarelli@inaf.it 👻 The programs included with the Debian GNU/Linux system are free software; the exact distribution terms for each program are described in the individual files in /usr/share/doc/*/copyright. Rem Debian GNU/Linux comes with ABSOLUTELY NO WARRANTY, to the extent was v permitted by applicable law. Last login: Wed May 11 16:24:25 2022 from 192.167.165.209 [irasoft] run setup-help for setup info. franco.tinarelli1@ska-vm03:~\$ VNC_ska-vm03 RDP_ska-vm03 ska-vm03-13 ALL CONNECTIONS Q Filter RDP_ska-vm03 >_ ska-vm03-13 VNC_ska-vm03

All connections can be used from PC, Tablet or Smart Phone through a web client.





The VNC connection is extremely stable thanks to the tightvncserver package and Debian OS (initially with CentOS systems and other VNC servers it collapsed every 10 seconds). The possibility of logging out has been disabled because the daemon dies and it is not possible to restart it automatically (you use the back of the browser to return to the guacamole console).



INAF SCIENCE GATEWAY: Login to VM with Guacamole RDP (RDP_ska-vm03)





INAF SCIENCE GATEWAY: Guacamole Preferences (On-screen keyboard)

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Remote Authent	lication Portal		SETTINGS 2 franco.tinarelli@inaf.it -					
VeduGAIN We the eduGAIN Logo to Login or Register to the RAP facility if you belong to an eduGAIN Idp.	Local Login	ⓒ 한 + 88 ♣ franco.tinarelli@inaf.it ↓	Active Sessions Preferences Options below are related to the locale of the user and will impact how various parts of the interface are displayed. Display language: + Timezone: Europe +					
		🏚 Home	DEFAULT INPUT METHOD					
Remote was writ		Settings J- Logout	The default input method determines how keyboard events are received by Guacamole. Changing this setting may be necessary when using a mobile device, or when typing through an IME. This setting can be overridden on a per-connection basis within the Guacamole menu. None No input method is used. Keyboard input is accepted from a connected, physical keyboard.					
			 Text input 					
	ska-vm03-13 VNC_ska	a-vm03	Allow typing of text, and emulate keyboard events based on the typed text. This is necessary for devices such as mobile phones that lack a physical keyboard.					
			 On-screen keyboard 					
		2	Display and accept input from the built-in Guacamole on-screen keyboard. The on-screen keyboard allows typing of key combinations that may otherwise be impossible (such as Ctrl-Alt-Del).					
			DEFAULT MOUSE EMULATION MODE					
RDP_ska-vm03			The default mouse emulation mode determines how the remote mouse will behave in new connections with respect to touches. This setting can be overridden on a per-connection basis within the Guacamole menu.					
ALL CO	DNNECTIONS	Q Filter						
D RE	DP_ska-vm03 ca-vm03-13		Tap to click. The click occurs at the tap to click. The click occurs at the tap to click. The click occurs at the					
	NC_ska-vm03		location of the touch. location of the pointer.					

Guacamole allows you to select the use of an On-screen keyboard for all those devices that do not have one.



INAF SCIENCE GATEWAY: Guacamole On-screen keyboard

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Thanks for the attention

Questions?