Portuguese **Distributed Computing** Infrastructure

First version of the internal management information system (Mi1.2)

Execution report

State:	**FINAL**
Dissemination:	**PUBLIC**
Authors:	**Joao Pina (INCD)**
URL:	**http://www.incd.pt**

Date	Author	Comments
21-Set-2018	Joao Pina	Initial version
30-Set-2018	Joao Pina	Initial version revised. New section added (current state of INCD portal development)
20-Out-2018	Joao Pina	Final Revision

Contents

List of Acronyms

FCT	Fundação para a Ciência e a Tecnologia
INCD	Infraestrutura Nacional de Computação Distribuída / National Distributed Computing Infrastructure

Executive Summary

The present report describes the initial version of the internal management information system. Since INCD it's a distributed infrastructure, running in several autonomous nodes , the deployment of this system presents a challenge.

This deliver presents an overview of the strategy adopted and the current status of implementation of the several services considered has the backbone for the information system.

Introduction

INCD provides computing and storage services to the national scientific and academic community in all areas of knowledge. The infrastructure is especially dedicated to provide scientific calculation services, supporting researchers and participation in national and international projects.

The deployment of an internal management information system is a key factor and it covers all aspects of the infrastructure. In order to be effective it needs a high control, monitoring and visualization of all information in the organization. In digital infrastructures this means control and monitor not only the infrastructure (hardware, software, contracts) but also human resources ,users and funding agencies. Since INCD it's a distributed infrastructure, running in several nodes (INCD-Lisboa, Minho and Coimbra), this deployment it's even more challenging.

Since the full deployment of an entire functional information system can take several years, it was decided to make an initial assessment and find the core areas this system should address . So the initial version of the internal management information system will focus on the following areas:

- **Management of infrastructure:** the INCD infrastructure it's a heterogeneous infrastructure composed of hundreds of network-connected computing and storage nodes used for so many different services (HPC, Cloud, HTC, etc) making it hard to monitor and manage.
- **System and Infrastructure monitoring:** Infrastructure and data management can only be done efficiently if one has accurate and comprehensive metrics and services in the data center. Namely, it is important to know the status of the services and what is the amount of resources (e.g., CPU, RAM, disk, network, energy) currently available or being used by specific applications and users.
- **User management and accounting:** User access to INCD infrastructure it's granted on having pré approved projects (FCT, ANI, H2020, etc) but access to the services it's user based. So it's necessary to keep track of the relation between users, services and corresponding projects. This information needs to be available not only to users but also to FCT who supports the INCD activities. Accounting provides vital information about the amount of resources (CPU, RAM, disk, network) consumed by INCD users and imputed to projects.

After an initial phase of consulting it was decided which technologies would be necessary to apply to each area and later develop and deploy the services. Following INCD internal policies, when possible the services will be mainly built on open source software and the development would follow a path of planning, development, and continuous enhancement. In this initial stage all services will be deployed and tested in the INCD-Lisboa node and after validation will be deployed in the remaining nodes.

Management of infrastructure

The service deployed at INCD for the Infrastructure management it's a customized version of the Open Source Netbox (https://netbox.readthedocs.io/en/stable/). NetBox allows keeping track of IT assets such as racks, servers, network equipment, virtual machines, and facilitates its management. INCD has developed tools to collect information from the equipments and injected it in NetBox facilitating the addition and update of the equipment. The next depicts some of the INCD racks as shown by NetBox:
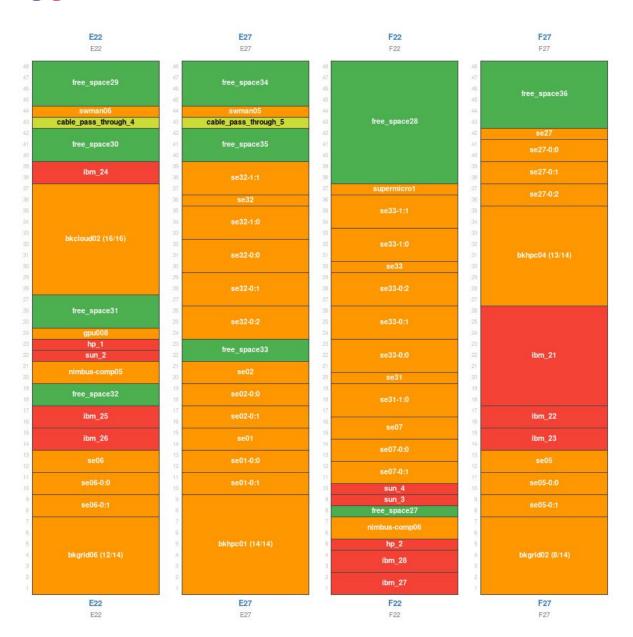
Figure 1: NetBox view of INCD racks E22, E27, F22 and F27

System and Infrastructure monitoring

System monitoring and infrastructure monitoring at INCD are: Nagios, Telegraf, Prometheus and Grafana. The collected metrics are broad, ranging from the generic CPU load, inbound and outbound traffic, IO, RAM to more detailed as IPC semaphores for IPC shared memory, and can be tailored as needed. The collected data can be used to trigger alarms to warn about out of bound metrics, and

can then be stored for later visualizations with elasticsearch Kibana. In Figure 2 we can see an example of one of the implemented systems:
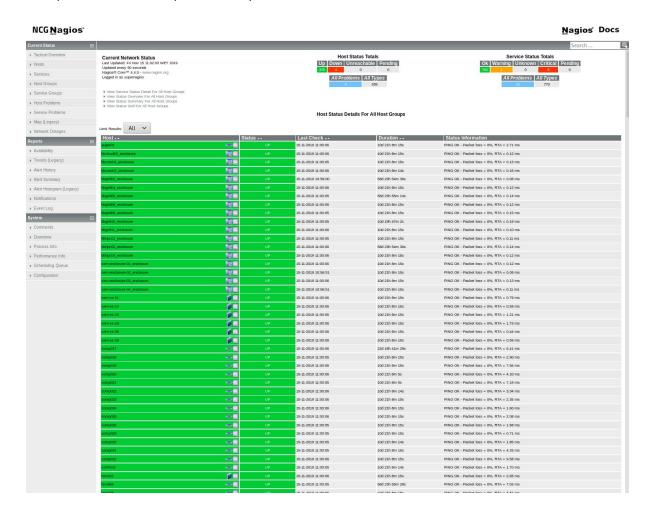

Figure 2: View of INCD NAGIOS setup

User management and accounting

Due to the specific needs of the INCD there was no open source solutions available it was needed to develop in house solutions. for user access, management and administration in the INCD infrastructure it was decided to build a user portal. This portal would have the following functionalities:

- User registration: at registration users will need to provide information about their use case , computing requirements and related pre approved projects.
- User access: approved users can access the platform and consult their account status information, individual service access and service accounting. The portal will also allow for a user to request access to new al services, add new funding and will provide an area where

users can report scientific achievements (articles, books, presentations, etc) . For users with role of project leader there will a functionality to assign users to a project.

- User management: this functionality will only be available for users with administrator roles and will allow to approve/reject new users, assign users to services , etc.

The user portal is not in production yet, but is already deployed internally. In the following figures you can check the several pages of the portal:
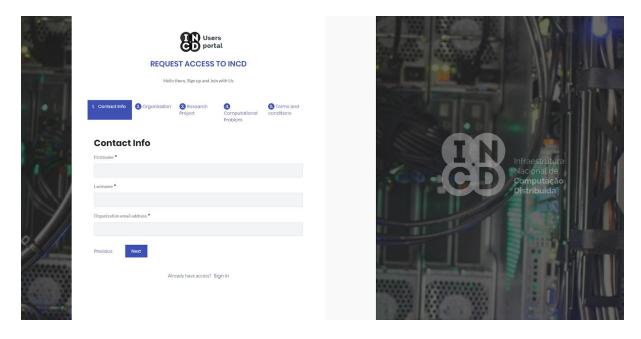

Figure 3: User view of the access request (on the top bar you can see several stages of the access request: Contact Info, Organization, Research Project, Computacional Problem, Terms and Conditions)

Portuguese **Distributed Computing** Infrastructure
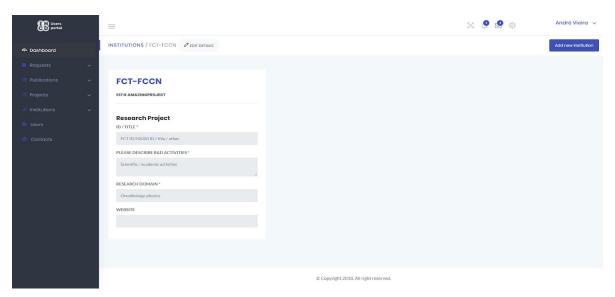

Figure 4: User view of the insert funding (FCT Project)
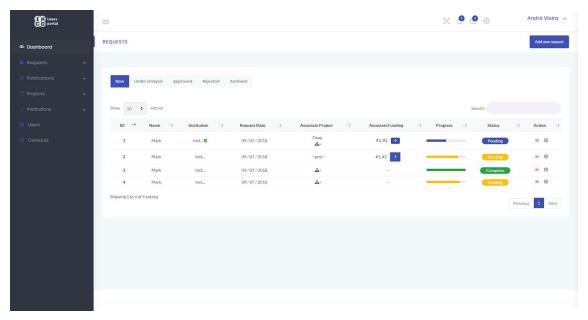

Figure 5: Admin view of the access requests. (on the top bar you can see several stages of the access request: New, Under analysis, Approved, Rejected, Arquived)
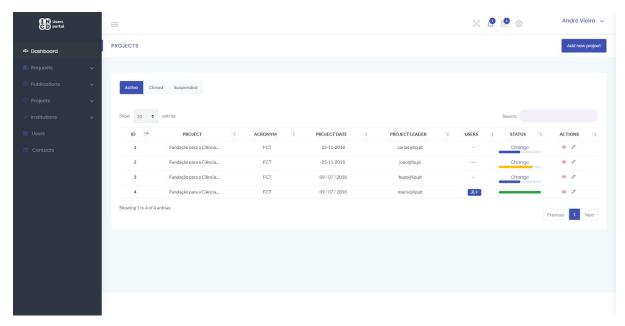
Figure 6: Administrator view of the active projects