



**CNPq**

Brazilian Center for Research  
in Energy and Materials



Brazilian Synchrotron  
Light Laboratory

# *Sirius Diagnostics Solution and IOC Deployment Strategy*

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- **Beam Diagnostics**

- Beam Charge and Current
- Fluorescent Screens
- Slits/ Scrapers
- Tune Measurement in the Booster
- Tune Measurement in the Storage Ring
- Filling Pattern Monitor
- Beam Position Monitors
- Bunch-by-bunch Feedback and Streak Camera
- Diagnostics Server

- **IOC Deployment**

- Overview
- Docker Containers
- Containers in production environment



# ***Beam Diagnostics***

## Beam Charge and Current

Bergoz ICT and BCM



Bergoz NPCT (DCCT)



Tektronix DMM7510 Digitizer



**DMM7510 IOC** can run on DCCT or ICT mode

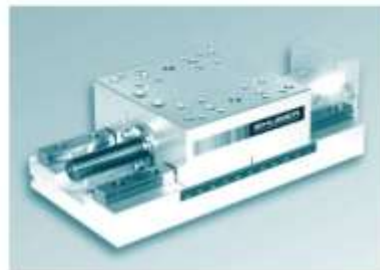


## Fluorescent Screens

Galil DMC 30017



Huber Linear Stage  
5101.20



Basler acA1300-75gm



IOC support from

- Galil-3-0
- aravisGigE

## Slits/ Scrapers

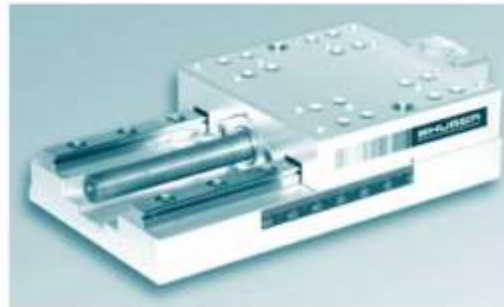
Galil DMC 30017



**IOC support from**

- Galil-3-0
- Soft IOC for high-level

Huber Linear Stage 5101.10 / 5101.07



## Tune Measurement in the Booster

Tektronix RSA6007A



FFT Mode

Keysight 33521B



White Noise



Valon 5009

Carrier Frequency



StreamDevice and asyn

RSA IOC support

- Sequencer calls RSA API
- A driver should be implemented in the future



## *Tune Measurement in the Storage Ring*

R&S® FSL



**Tracking generator does beam excitation**

**IOC support**

- StreamDevice and asyn

## Filling Pattern Monitor

### Transfer Lines

Bergoz FCT

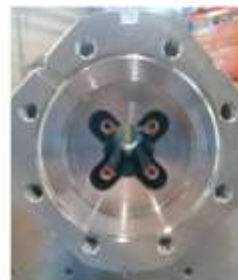
Keysight DSOS104A



### Storage Ring

Pickup

Lecroy WavePro 725Zi



- No IOC during commissioning (remote desktop)
- Planned IOC will probably use StreamDevice

## Beam Position Monitors



- MicroTCA.4
- AMC FPGA + FMC ADC
- asyn-based (NDArrayDriver)



- 1 timing receiver
- Up to 20 BPM processors
- 1 FOFB processor (future)

- RF front ends
- Signal Conditioning

## ***Bunch-by-bunch Feedback***

Dimtel iGp12



- **Comercial Solution**
- **IOC provided by Dimtel**

## ***Streak Camera***

Hamamatsu C5680



- **Hamamatsu Software**

## *Diagnostics Server*

PowerEdge R230





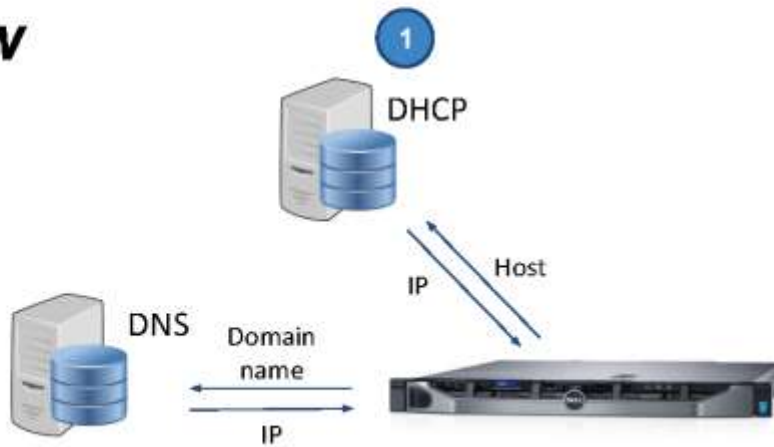
## *IOC Deployment*

# ***IOC Deployment***

## Overview

- IOCs can run as systemd services.
- Docker images are created for each IOC.
- Diagnostics servers are diskless.
- NFS server provides IOCs with their root and home directories.
- Scripts create the containers that run the IOCs.

## Overview

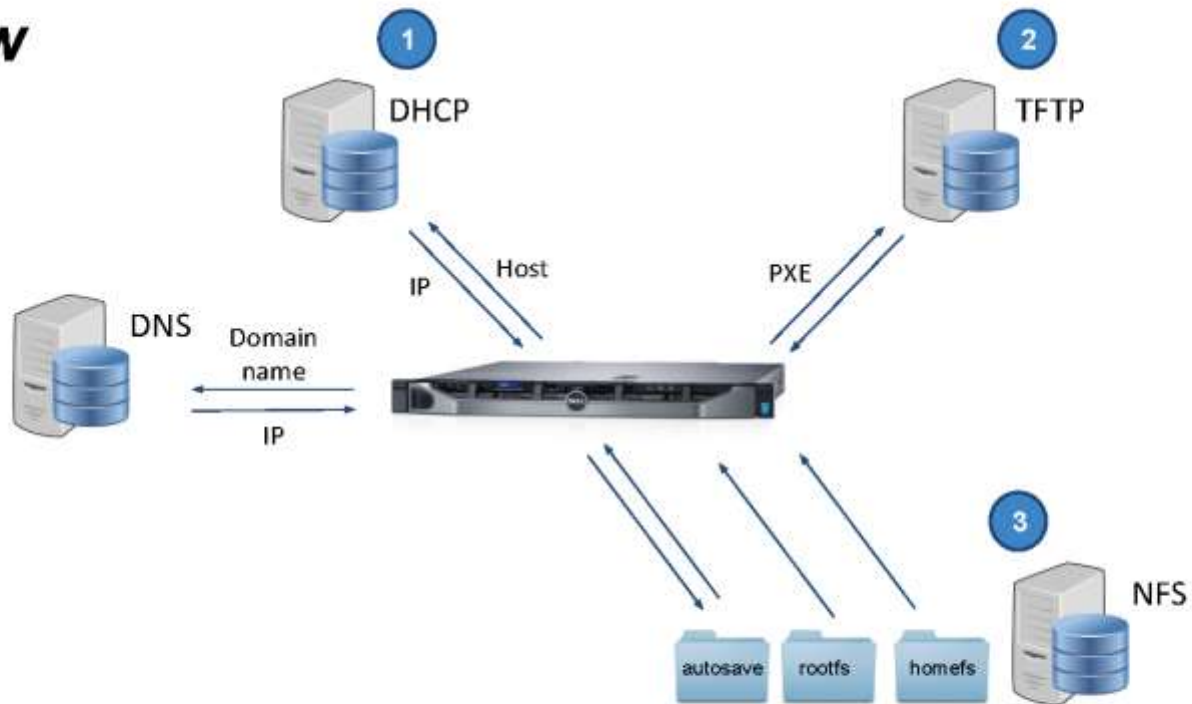




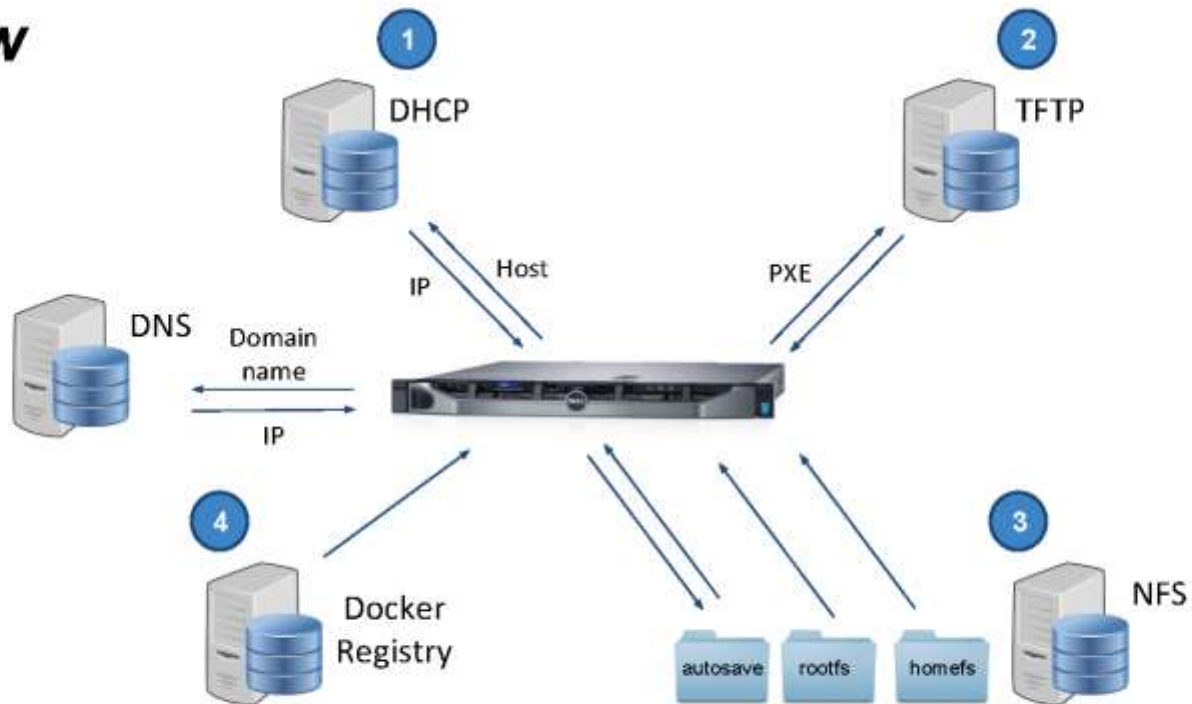
## Overview



## Overview



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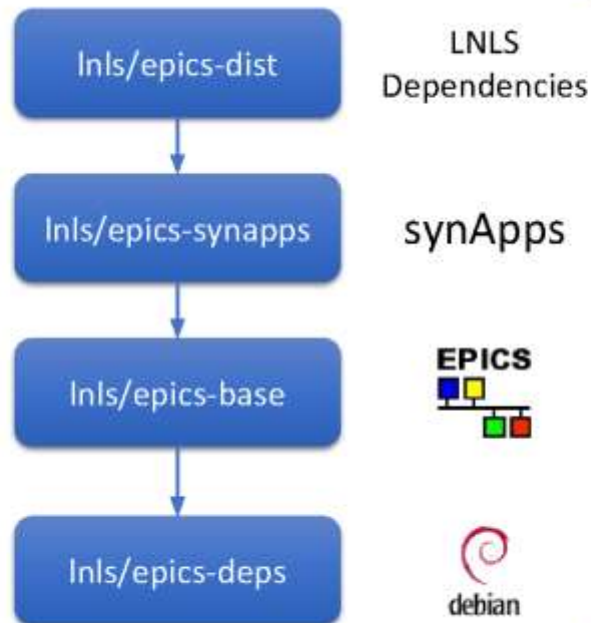


## **Docker Containers**

- Application and dependencies packaged together
- Consistent and reproducible environment
- Isolation

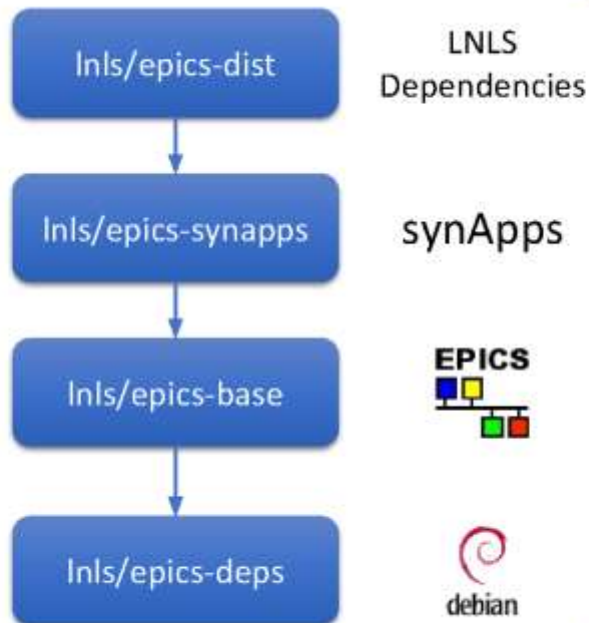
## Docker Containers

### Common Dependencies

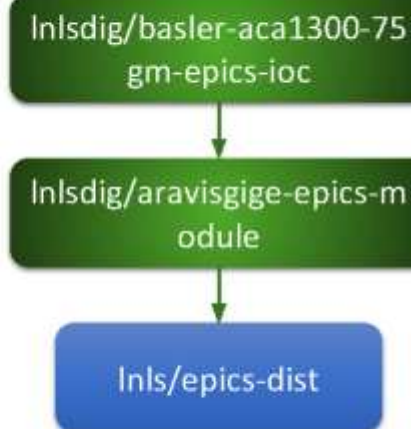


## Docker Containers

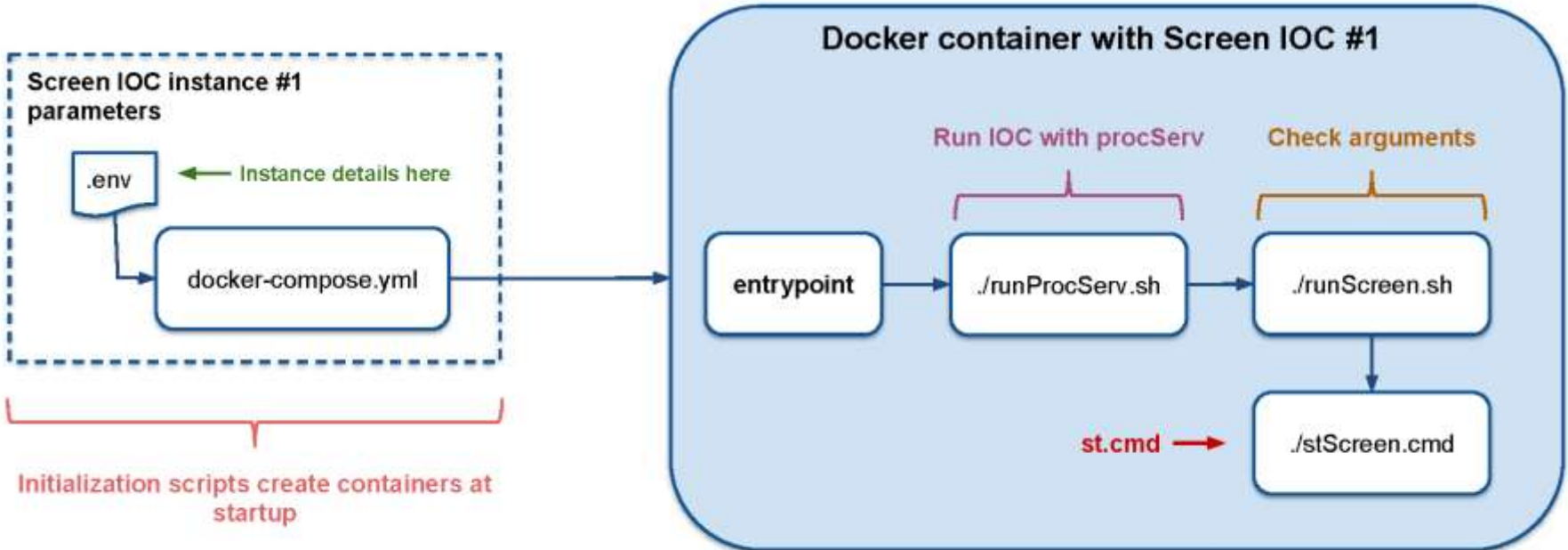
### Common Dependencies



### App Specifics



## Containers in production environment



## *Our Repositories*

- **IOCs:** <https://github.com/lpls-dig>
- **Docker images:** <https://hub.docker.com/u/lpls-dig/>
- **Deploy:**
  - ROOTFS: <https://github.com/lpls-sirius/debian-rootfs>
  - NFS Server: <https://github.com/lpls-sirius/docker-nfs-server-composed>
  - TFTP Server: <https://github.com/lpls-sirius/docker-tftp-hpa-composed>
  - DHCP Server: <https://github.com/lpls-sirius/docker-dhcpd-composed>
  - Docker Registry: <https://github.com/lpls-sirius/docker-registry-composed>
  - DNS Server: <https://github.com/lpls-sirius/docker-bind-composed>





## *Conclusion*

***Thank you***