GSAW 2018

THE ETHEREAL GROUND SEGMENT

INNOVATING SOLUTIONS

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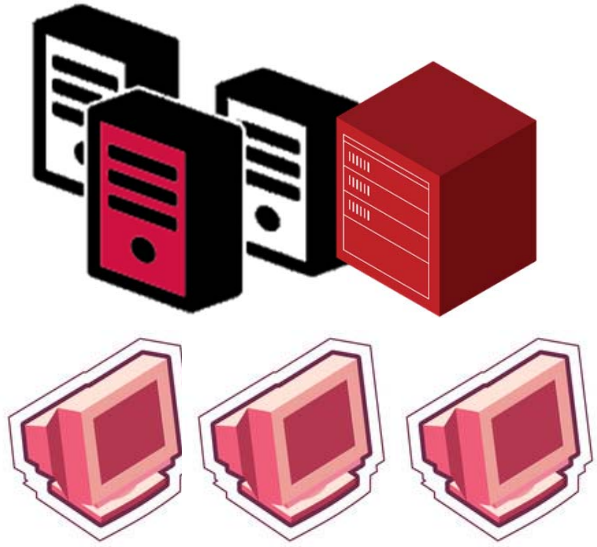
PHYSICAL

A physical deployment involves dedicated hardware (servers, workstations, storage units…) running the application software on top of a specific operating system



Shortcomings

- Weak scalability
- Large resources footprint: power, physical span…
- Entanglement
- Hardware and software obsolescence
- High deployment time
- Rigid workstation roles
- Hard to replicate

VIRTUAL

A virtual deployment uses specialized hardware and software hosting virtual machines, each running the application software and specific operating system; user positions are thin-clients

Advantages w.r.t physical

- Improved scalability
- Less resources footprint
- Entanglement not an issue
- Manageable hardware and software obsolescence
- Lower deployment time
- Flexible workstation roles though virtual desktops
- Easy replication

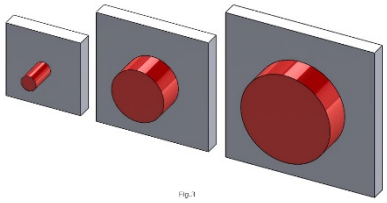
VIRTUAL

GMV started deploying **virtualized ground segments** several years ago, notably for nbn™ and Hellas Sat

Let us share some lesson we learnt along the way...

VIRTUAL

Software changes: virtualizing the software was trivial: fixing some issues that didn't show up in physical deployments



Configuration changes : parametrize and refactor the configuration (such as ports); centralize some services (LDAP/Active directory)

Virtualised desktops: thin clients are very flexible, but their deployment may be tricky

VIRTUAL

Disk access: disk extensive software elements are better placed in specific VMs with direct access to the physical disk, bypassing the virtualization layer

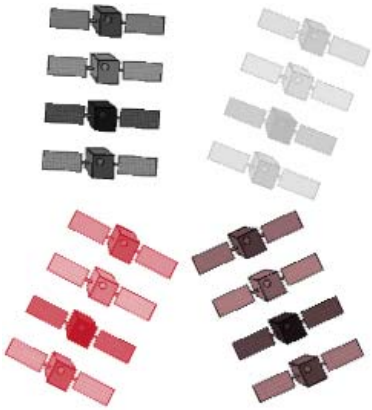
Disable virtual memory ballooning: due to specialized memory access patterns, ***hifly***, GMV flagship satellite fleet monitoring and control product, required disabling virtual memory ballooning

VIRTUAL

VM slim down: the smallest the VM, the better. Modularization. Factor out common services. Rationalisation of existing services

Deployment enhancements: in virtual deployments we tend to use more VMs than in the equivalent physical deployment, so ease of deployment is more important. Automated deployment. Use of templates

ETHEREAL

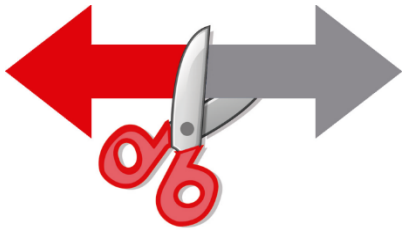


As of now, GMV is **reimagining the ground segment** to suit the specific needs of larger systems, specifically (massive) satellite fleets

Let us share our vision with you…

ETHEREAL

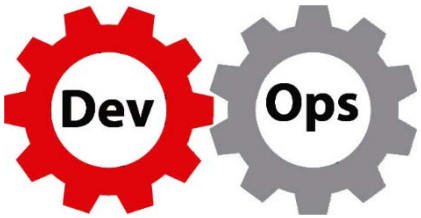
Software and configuration split: each function state vector is made independent from the software and placed in the cloud. Functions are generated on-the-fly from a template and instantiated using the vector



Historical data: the (long-term) historical data storage can be moved elsewhere, even to the cloud

Workstation thinning: the less services in the workstation, the better; the ethereal workstation is ubiquitous (desktop, smartphone); exploit modern web paradigms (reactive design)

Availability delegation: Availability features delegated to the function infrastructure: we may summon a new function instance for semi-hot redundancy, or use the software and configuration split for data alignment



Deployment enhancements: The ease of deployment reaches new heights when considering thousand of functions. Goal: full continuous integration, reducing the traditional ‘drama’ when installing a new version of the ground software in the operational environment

Software wise – containers: containers (docks) are very nimble and can be efficiently run within virtual machines, so that deployment flexibility skyrockets. Beware containers are more dependant on the host

Hardware wise – hyper-converged infrastructure: virtual computing platform that natively converges compute, virtualization, and storage into a single software-defined architecture that is the only one that interacts with the OS

CONCLUSIONS

The days of "**one software running on one operating system on one piece of hardware**" may be coming to an end

Modern trends such as service oriented architectures (SOA), virtualization, cloud computing or infrastructure as a service (IaaS) contribute to the **etherealization** of software systems

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THANK YOU

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