Running SAFNWC MSG and PPS software on virtual machines

Oana Nicola, Andrei Diamandi, Simona Oancea
National Meteorological Administration, Sos. Bucuresti-Ploiesti No. 97, Bucharest, Romania

ABSTRACT

A virtual machine is a tightly isolated software container that can run its own operating systems and applications as if it were a physical computer. Nevertheless, a virtual machine is composed entirely of software and contains no hardware components whatsoever. As a result, virtual machines offer a number of distinct advantages over physical hardware. Some of them are the following: multiple OS environments can co-exist on the same computer, in strong isolation from each other; application provisioning, maintenance, high availability and easier disaster recovery.

The main goal of the Satellite Application Facility on support to Nowcasting and Very Short-Range Forecasting (VSRF) is to produce the software packages to deal with the Nowcasting and VSRF using the characteristics of the MSG SEVIRI data and the NOAA and EPS AVHRR data.

These software packages were installed and are running in many National Meteorological Services. However, the installation of SAFNWC/PPS requires advanced knowledge of the operating system and therefore assistance from the IT departments.

At the National Meteorological Administration of Romania the SAFNWC software packages have been installed and run on SUN and Intel Linux machines since the release of the first versions. Starting with 2006, virtual machine installations of the SAFNWC software were tested and then used operationally.

This poster presents the advantages of using virtual instead of physical machines for running SAFNWC PPS and MSG software in an operational environment.

Virtual machines advantages:

Compatibility
Just like a physical computer, a virtual machine hosts its own guest operating system and applications,
and has all the components found in a physical computer. As a result, virtual machines are completely compatible with all standard x86 operating systems, applications and device drivers, so you can use a virtual machine to run all the same software that you would run on a physical x86 computer.

Isolation
While virtual machines can share the physical resources of a single computer, they remain completely isolated from each other as if they were separate physical machines. If, for example, there are four virtual machines on a single physical server and one of the virtual machines crashes, the other three virtual machines remain available. Isolation is an important reason why the availability and security of applications running in a virtual environment is far superior to applications running in a traditional, non-virtualized system.

Encapsulation
A virtual machine is essentially a software container that bundles or “encapsulates” a complete set of virtual hardware resources, as well as an operating system and all its applications, inside a software package. Encapsulation makes virtual machines incredibly portable and easy to manage. For example, you can move and copy a virtual machine from one location to another just like any other software file, or save a virtual machine on any standard data storage medium, from a pocket-sized USB flash memory card to an enterprise storage area networks.

Hardware Independence
Virtual machines are completely independent from their underlying physical hardware. For example, you can configure a virtual machine with virtual components that are completely different from the physical components that are present on the underlying hardware. Virtual machines on the same physical server can even run different kinds of operating systems.

RESULTS

Products obtained in an operational environment by running the SAFNWC MSG and PPS using virtual instead of physical machines:

SAFNWC MSG

The main objective of SAFNWC/MSG is the generation of 10 near real-time meteorological products in support of nowcasting and very short range forecasting.

SAFNWC MSG Products – 12.08.2012 05:15 GMT
Figure 6: Convection Rainfall Rate

Figure 7: Stability Analysis Imagery – KI

Figure 8: Stability Analysis Imagery – LI
SAFNWC PPS

SAFNWC/PPS implements the functionalities required to generate the SAF products for Nowcasting and very Short Range Forecasting from polar orbiting satellite data. The core of the SAFNWC/PPS is constituted by stand-alone applications responsible to generate the different meteorological products.

SAFNWC PPS Products – Global METOP 22.08.2012 19:01 GMT

Figure 9: Cloud Mask

Figure 10: Cloud Type
Figure 11: Precipitation Clouds

Figure 12: Cloud Physical Properties – Liquid Water Path
CONCLUSIONS

The main reasons to adopt virtualization software are: get more out of your existing resources, reduce datacenter costs by reducing your physical infrastructure, gain operational flexibility and improve desktop manageability and security, build up software continuity through improved disaster recovery solutions.
In the context of reviewing portability of the SAFNWC MSG and PPS software, there is a possibility to distribute a virtual appliance. This means that it will be possible to run both MSG and PPS software on a single computer, but in different, independent virtual machines.

REFERENCES

SAF/NWC/CDOP/INM/SW/SUM/2, Issue 6, Rev. 0
SAF/NWC/CDOP/SMHI-PPS/SW/SUM/1, Issue 2.4, Document Revision 2