WHAT'S INSIDE

HELYX AND ITRINEGY COLLABORATE TO CREATE A VIRTUAL TEST LAB IN THE CLOUD

Helyx Secure Information Systems Limited is a professional services company specializing in the provision of information management, exploitation, assurance, and geospatial information systems, services and solutions, principally to Government and the UK Ministry of Defence (MOD).

Helyx provides access to a wealth of expertise, to facilitate informed decision making. Their range of services encompass technical consultancy services and solutions, data analytics, training design, development and delivery, and they are at the forefront of a number of innovative Research and Development (R&D) programmes. In support of the MOD, Helyx has enabled Defence, Science and Technology Laboratory (Dstl) to deliver cutting-edge science and technology for the benefit of the nation and allies.

Working in collaboration in support of a Dstl R&D programme, Helyx and iTrinegy recently joined forces to develop a realistic test environment that can operate in a Cloud environment.

THE PROBLEM

Dstl needed to understand how Geospatial Intelligence (GEOINT) could be better disseminated, particularly in Denied, Degraded, Intermittent or Limited Bandwidth (DDIL) environments.

A very real risk in the development of an application for use in austere environments, is that the outcome of an expensive and time-consuming test and acceptance programme, might result in a solution that is not fit-for-purpose when operated in a real-world environment.

A new approach to application validation was required which, as a long-term supplier, Helyx sought to deliver.

This task focused on how the GEOINT information itself is packaged, organized and shared, and it was essential to have an awareness of the constraints of various network characteristics, and their implications on how information is disseminated, and thus to have a test environment that best represented DDIL communications' characteristics.

Through working together as part of the Sirius Consortium[1] delivering the CSIIS (Command, Control, Communications, Computing, Intelligence, Surveillance and Reconnaissance - Secure Information Infrastructure and Services) Research Programme, Helyx and iTrinegy recognized that their complementary areas of expertise could be combined to deliver the appropriate solution.

"The first opportunity to provide a solution came when we started work on the 'Dissemination of GEOINT Phase 2 Project[2]", explains Helyx's Chief Architect.

THE PROBLEM CONT./

GEOINT is synonymous with very large data sets, and it can present very real issues if the data is required at the tactical edge of the battlefield. For this project the customer's challenge was to enable GEOINT data, available within a static environment or headquarters (HQ), to be fully utilized in support to the tactical edge of the battlefield.

In an earlier Phase 1 task, which Helyx were involved with, the concept of an Information Broker was developed. The Information Broker is a system that allows a user to understand what datasets are available to them, when they are in a remote environment and to synchronize that data according to their own particular needs. This approach was tested in a 'fat' network pipe, but to be meaningful, would latterly have to be tested in a real-world network.

For subsequent testing to be effective, an emulation of the network in the Dstl lab would be required.

THE SOLUTION

To properly test an application, a realistic test environment (often called a Lab) is required. Two approaches are possible: a physical lab with actual equipment; or a virtual lab. The virtual lab has the virtue of being much faster to set up and tear down, but it too has a couple of possibilities; namely an 'in-house' virtual lab e.g. VMware (on hardware), or a "Virtual Test Lab" in the cloud.

The Virtual Test Lab in the cloud approach was chosen as it did not rely on the availability of Virtual (VMware or other) infrastructure. The cloud infrastructure would be provided by UKCloud, a British cloud provider providing specialist multi-cloud services to organizations in the UK public sector. The realistic network in the Virtual Test Lab would be delivered by iTrinegy's NE-ONE Enterprise Flex, a virtual appliance version of the NE-ONE Enterprise multi-path (Meshed) network emulator, which would be installed onto the UKCloud platform and used to create the DDIL communications environments needed to demonstrate how GEOINT data would be transmitted to the battlefield edge.

The NE-ONE Enterprise Flex, virtual appliance Network Emulator was installed onto the Cloud platform and used to create the appropriate network conditions

When setting up the Virtual Test Lab, the options were to use either Openstack, or vCloud (a VMware product), which would allow UKCloud to separate their different customer environments. Within the virtual environment provided, different virtual locations were created for the HQ and the remote locations, which, in this particular instance, involved maritime assets, but would be equally suitable for land and air environments.

THE SOLUTION CONT./

Within a Cloud environment routing between networks in a single customer is provided by the network layer: Neutron in the case of Openstack, and NSX in the case of vCloud. However, for this lab to work, the routing needed to be performed by the NE-ONE Enterprise, in order to deliver the realistic network behavior. This led to talks with UKCloud about how to operate the NE-ONE Enterprise emulator in their environment which would link these different virtual network segments together. This solution was to use the NE-ONE Enterprise in Mesh mode with a separate port (a virtual physical port) on the emulator connecting to each virtual network segment inside the cloud infrastructure.

This would permit several subnets within the cloud environment, with different machines on each subnet and the NE-ONE Enterprise routing between those subnets.

Both Openstack and vCloud presented challenges to the integration of NE-ONE Enterprise into the Cloud set up, but these were overcome by the close collaboration of the Helyx DevOps team and iTrinegy's Technical Specialist team.

Helyx's Chief Architect commented that "The Virtual Test Lab has enabled the testing of solutions in realistic network environments, and enabled us to verify that the application would work as envisaged, and over a simulated SATCOM link."

CONCLUSION- ADVANTAGES OF A VIRTUAL TEST LAB IN THE CLOUD

Helyx continues to support the development of the MOD's GEOINT capability development, which is now managed under the SERAPIS Framework Agreement Lot 4 Assured Information Infrastructure[3] led by QinetiQ.

The Virtual Test Lab in the Cloud is available, not only to Dstl, but to other organizations who need to verify application function and performance over networks.

Helyx commented: "With the experience we have gained we feel that this has proved the benefits of offering a Cloud-based test environment. We know that it is often very expensive to run on-site trials - they need to be booked in advance and there is competition for the resources: the compute resource, the comms network and the personnel that would be associated with running those trials. A Cloud-based environment is much more flexible, in that you don't have those same restraints - we can deliver a shared service which makes it easy to provide the required network conditions. Being able to collaborate with our customers in a cloud environment where we can experiment with real-world network conditions, is of great benefit".

Footnotes

[1] The Command, Control, Communications, Computing, Intelligence, Surveillance and Reconnaissance - Secure Information Infrastructure and Services (CSIIS) Research Programme has been established by Dstl on behalf of MOD to respond in a timely manner to research needs across a number of technical disciplines/strands. The research programme, led by QinetiQ, consisted of a consortium (Team Sirius) of over 60 organisations including leading UK Defence industry prime contractors, subject matter experts, non-defence companies and academia.

https://www.qinetiq.com/en/what-we-do/services-and-products/csiis

[2] Dstl wished to understand how Geospatial Intelligence (GEOINT) can be better disseminated, particularly in Denied, Degraded, Intermittent or Limited Bandwidth (DDIL) environments. These communications environments may be a result of dissemination to users in very austere or remote locations and/or may be a result of the actions of adversaries, and as such the characteristics of these environments can change with time. Given this varying communications context, Dstl needs to understand how GEOINT information can be best disseminated.

[3] The SERAPIS Framework Agreement has been created to enable Dstl to influence and gain access to the most diverse expertise and talent available across the industrial supplier base. It replaces the CSIIS Research Programme. Serapis Lot 4 covers the development of C4ISR Communications and Networks. It aims to exploit and drive emerging concepts and technology in military and civilian communications infrastructure and include the development of policy, technology and architectural options for the provision of assured information, Information Management and Exploitation (IM/IX). https://www.qinetiq.com/en/what-we-do/services-and-products/serapis-framework