Tactical Edge

Maximum capabilities away from base
“Disconnected / Deployed Edge”

Adrian Keward
UK MOD Technical Lead
Disconnected is not just Defence
Industrial Edge

<table>
<thead>
<tr>
<th>Device</th>
<th>Actuator, Sensor PLC</th>
<th>~100,000</th>
</tr>
</thead>
<tbody>
<tr>
<td>Line Server</td>
<td>Ruggedized Industry PC, PLC, HMI, SCADA</td>
<td>~1000</td>
</tr>
<tr>
<td>Plant Data Center</td>
<td>Racks in IT room SCADA, PPS, MES, PLM</td>
<td>~100</td>
</tr>
<tr>
<td>Regional Data Center</td>
<td>Country Specific PPS, MES, PLM, ERP</td>
<td>~20-50</td>
</tr>
<tr>
<td>Headquarter Data Center</td>
<td>MES, PLM, ERP</td>
<td>~1-3</td>
</tr>
</tbody>
</table>

Operational Technology (OT)

Information Technology (IT)

EDGE

CORE
Factory Edge

Any workload, any footprint, any location

**End-user premises**
- Edge server/gateway
- Infrastructure edge

**Provider edge**
- Provider far edge
- Provider access edge
- Provider aggregation edge

**Provider or enterprise core**
- Regional data center
- Core data center

**Scale**
- MES Integration
- Predictive Maintenance
- Quality Assurance

**Footprint**
- Different Stakeholders (OT vs. IT)
- Special technology requirements
- Long Depreciation Cycles
- Firewalls

**Device or Sensor**
- "last mile"
The Bigger Picture

**Healthcare**
Enhanced diagnostic and image analysis, early pandemic detection, and rapid response.

**Automotive**
Predictive maintenance, autonomous ride sharing, driver assistants, and AR/VR.

**Financial services**
Trading, personal finance planning, fraud detection, and customer operations.

**Transportation and logistics**
Traffic flow management, autonomous trucking and delivery, and surveillance.

**Technology, media, & telecommunications**
Network maintenance and optimization, self-learning security, neural nets, personalized content. Faster content streaming and decreased degradation.

**Retail and consumer**
Personalized production, delivery, & management, and demand prediction and analysis.

**Energy**
Predictive infrastructure maintenance, grid operations and storage, and smart metering.

**Manufacturing**
Process correction and optimization, on-demand production, and AR/VR.
Accelerated AI Platform

- Hybrid Cloud Platform for the entire ML lifecycle
- Accelerates delivery of AI powered intelligent applications across data centre, edge, and public clouds
- Drives agility & faster innovation
Disconnected is the Goal
End-to-End Platform
The OpenShift Defence Armoury
EXCALIBUR
  • Transportable, Disconnected OpenShift Full Cluster

ANABASII
  • Low to High Secure Courier Service

MEDUSA
  • Defence Communities, sharing Open Source within Trust levels
Red Hat’s focus

Tactical Edge
- Edge Endpoint
- Edge Gateway
- Edge Server

Chainmail / Mace
Durandal / Lightsabre
Excalibur

Edge Tiers

“Somewhere”

Programs
- Provider Far Edge
- Provider Access Edge
- Provider Aggregation Edge

Defence Clouds
- Regional Data Center
- Core Data Center

Device or Sensor

Scale

Partners

Footprint

“last mile”
Anabasii is a courier service for software artefacts. It provides an extensible, standards based workflow, which helps to create an end-to-end software delivery capability that can securely cross all environment boundaries.
Specifics

- Helping customers move workloads from Official (Low) to Secret (High) within modern application design utilizing containers.
- This is built on experience by Red Hat Services within the US & UK government agencies.
- Tool and Resources
  - Develop @ Official and move to Secret (Black to Red)
  - Develop @ Secret and use at Official (Red to Black)
  - Trust to Trust (Red to Red)
- Reusable artefacts from US DoD Platform One
ANABASII – LOW TO HIGH

LOW

- Sigstore
- L7 P2P Endpoint
- Policy Engine
- Artifact Library
- Build
- Security Scan
- Develop
- Code Analysis
- Store
- Sign

HIGH

- Sigstore
- L7 P2P Endpoint
- Policy Engine
- Artifact Library
- Store
- Verify
- Deploy

Transfer
Transportable, Disconnected, Full OpenShift Cluster
AKA “Datacentre in a Backpack”
Why Disconnected?

Disconnected Non-Military
- Plan for loss of connectivity
- Design for resilience and low down time

Disconnected Military
- Presume loss of connectivity at any time
- Train and test repeatedly
- Take everything you might need
- Prepare for disruption or lack of civil infrastructure

NATO C3 - Support to Disaster Relief (DR)
NATO C3 - Support of Non-Combatant Evacuation Operations (NEO)
The Drivers behind Tactical Edge

- **Fostering faster data-driven outcomes**
  - Deliver better solutions
  - Make faster decisions
  - Use resources more efficiently

- **Delivering better experiences, anywhere**
  - Use immersive apps
  - Online Synthetic training, etc.
  - On a Vehicle, ship, plane, or even in space

- **Meet data residency/Deployed requirements**
  - Storing or processing of classified data within a geographical / Sovereign area
Tactical Edge comes with its own considerations

**Scale**
Infrastructure and application scale-out to 100s to 1000s of nodes and sites

**Location**
Variability in space, power/cooling, hardware resources, and network connectivity

**People**
As your architecture scales, how will your teams scale?

**Security**
Additional security when compute is deployed or could be lost/stolen
Tactical Edge

**Defence Ecosystem**
MOD ambition is to provide a platform-agnostic environment to support the appropriate sharing of reusable software and assets between external industry partners and international organisations. The MOD is working closely with partners and NATO to make the service available to industry partners and develop a standard agreement for such practices.

**End-to-End Secure Automation (ANABASII)**
Move workloads from Official (Low) to Secret (High) within modern application design utilizing containers and Automation. This is built on experience by Red Hat Services with the US & UK government agencies.

**Digital Communities**
For the first time developers inside defence can share code, through automation updating and checking-in code is simplified, triggering builds and test sequence of events, ultimately resulting in the application being deployed onto the platform, where ever the target is required.

**Rapid Exploitation of Digital Applications**
Automation is the key to rapidly exploit Digital Applications, with shared repositories and pipelines the reality of applications being available where ever they are required in almost real time. **One Process, One System, One button**
US NAVY CANES

CANES is the consolidation and enhancement of the requirements for five existing legacy network programs, as well as a single support framework for all C4I applications that currently require dedicated infrastructure to operate delivered and managed legacy systems. These include the Integrated Shipboard Network System (ISNS), Sensitive Compartmented Information (SCI) Networks, and Combined Enterprise Regional Information Exchange System Maritime (CENTRIXS-M).

Lockheed Martin

Create ubiquitous solution to transform aircraft maintenance to streamline the testing and operation of aircraft construction and maintenance capabilities in real time, no matter how remote the facility.

KubeFrame (US Market) aka EXCALIBUR (WW)
Based on Zero Touch Provisioning
- OpenShift Deployed Full Clusters @ Edge
  - 1x Bastion Host
  - 3x Bare Metal Nodes
- Full disk encryption
- Single Power cable (Can be HA)
- Single Network cable (Can be multiple)
- Flight / Waterproof travel cases
- No AirCon works up to 55°C
Example Hardware
8-40 Cores per Server
Up-to 1.5TB Memory
4x M2 NVMe SSD
PCI-e GPU

DDIL
Denied, Disrupted, Interrupted, and Limited
Medusa

Digital Communities allows the sharing of not just information but applications, these can reflect the nature of different requirements of different alliances.
DIGITAL COMMUNITIES

Support of Non-Combatant Evacuation Operations (NEO)

Support to Disaster Relief (DR)
Excalibur Workloads

DevSecOps provides the workloads at the Edge, from AI, ML and DL to Planning
Example Workloads

SEAD / DEAD

Decision Making

Taking and Holding (Planning)

AI Image Analysis

Machine Learning Operations

Littoral Warfare / Island Hopping
Thank you

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