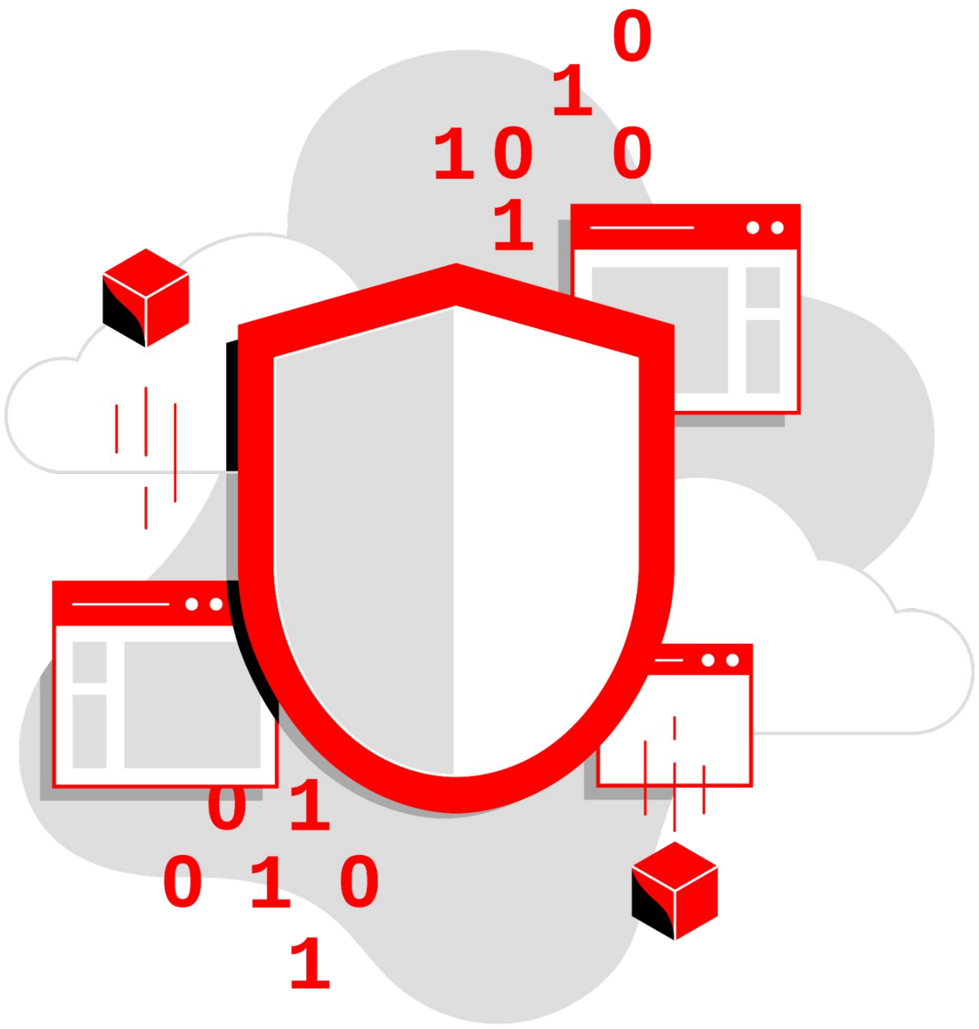
Red Hat

Security Symposium

Data Security in the Hybrid Cloud



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Principal Product Manager, Team Lead

Introductions

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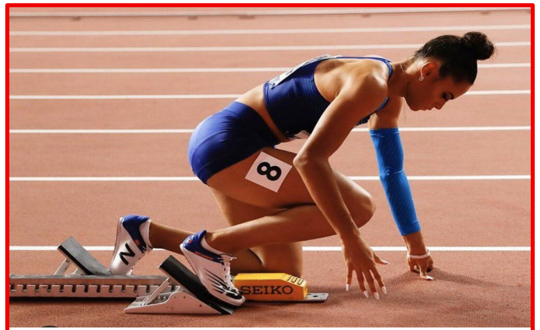
Agenda

- Challenges
- Security across the data lifecycle and hybrid cloud
- Red Hat Solutions

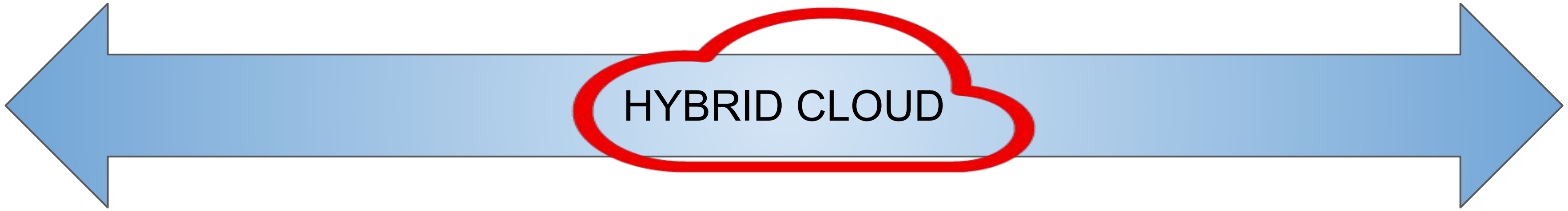
Security across the data life cycle – Hybrid Cloud



DATA AT REST

DATA IN MOTION

DATA IN ACTION



HYBRID CLOUD

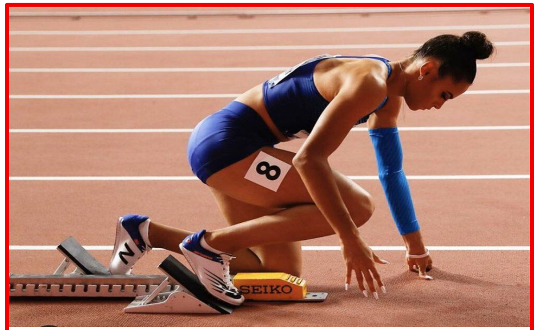
Challenges

- “The cloud is just someone else’s datacenter”

BUT

- Security is a big(ger) problem with more workflows and different cloud paradigms
  - Cannot outsource all security control to the cloud vendor
  - Lack of full control – In the hybrid cloud, every controllable constant of the traditional data center may now be a variable
  - How does this affect data at rest, in motion and in action?
- Must address CIA triad*
  - Confidentiality – who has access to the data
  - Integrity – is the data trustworthy and unmodified
  - Availability – is the data appropriately accessible when needed

CIA Definition credit : https://whatis.techtarget.com/definition/Confidentiality-integrity-and-availability-CIA



DATA AT REST

Confidentiality

- Encrypted cloud block storage
  - Transparent, easy, obvious
  - Is access encrypted?
  - Who owns & where are the encryption keys?
- Encrypted cloud object storage
  - Introduces in-motion encryption requirements
- File / volume level access controls
  - Consistent with on-premise

Integrity

- File-level integrity checking
  - AIDE, Tripwire®-like tools
- Cryptographic verification
  - IMA hashes
  - Encryption verification
- Filesystem / volume integrity checks
  - Dmintegrity
  - Checksums, etc.
  - Object integrity
- Immutability / Read-only access
  - WORM

Availability

- Snapshots w/verification
- Backups
- Access controls
- RAID or HA redundancy
- Multi-region data availability
  - With storage mirroring
  - Or erasure encoding

DATA IN MOTION

Confidentiality

- Application level network encryption
  - TLS, SSL
  - Most common
- Encrypted tunnels
  - For legacy applications or ssh
  - Broad compatibility
- Network segmentation
  - To eliminate exposures

Integrity

- Encryption verification
  - Cryptographic hashes required to match for de-encryption to function
- Network traffic checksums
- Application-level verification
  - Database integrity checking
  - Erasure encoding for distributed data

Availability

- Redundant networking access
  - Physical network failover
  - Virtual networking duplication
- Application redundancy
  - With consistent access controls
  - Databases, object stores, etc.

DATA IN ACTION

Confidentiality

- Execution isolation
  - Resource controls
  - Security labels
  - CPU-core affinity
  - Pod / cluster affinity
- Memory encryption
  - Relatively new
  - Platform / system level
- Confidential Computing
  - Trusted Execution Environments (TEE)

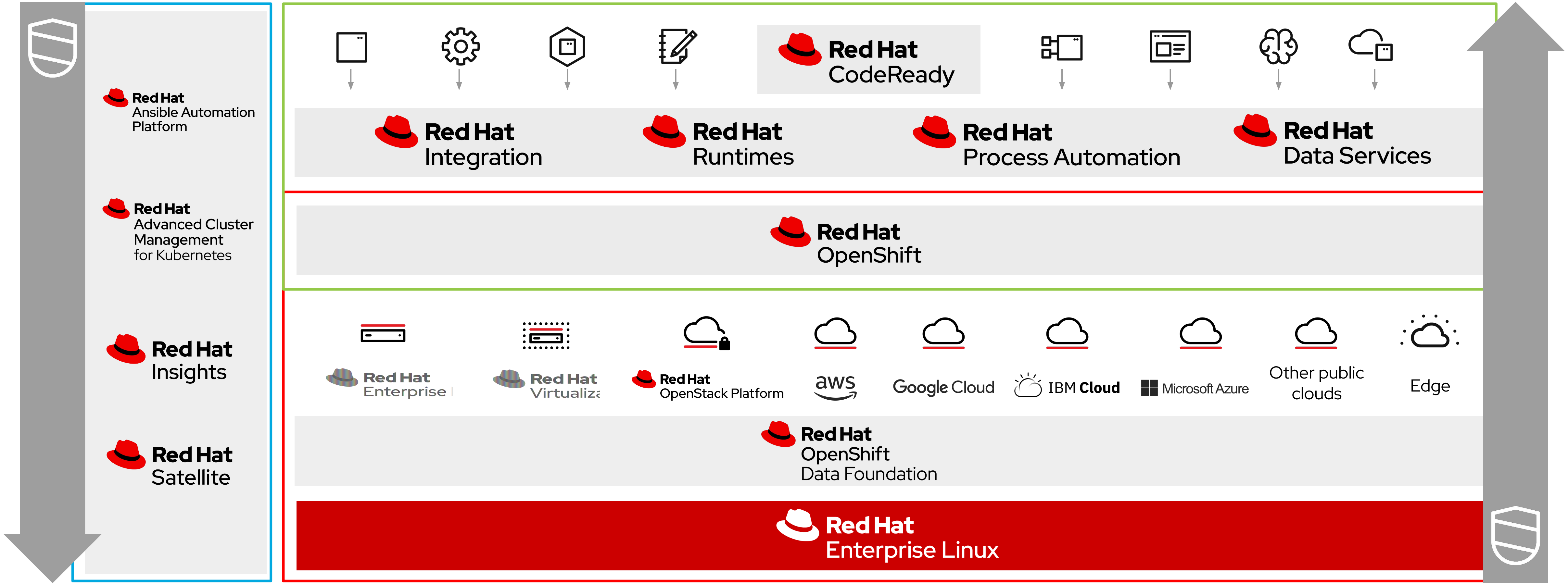
Integrity

- Physical memory integrity verification
  - Checksums,
  - Error Correction Code
- Application level verification
- Cryptographic verification when memory is encrypted

Availabiity

- Clustering w/failover
- Containers for higher availability
- Multi-region availability

Hybrid cloud security: Layered defense in-depth



Red Hat Ansible Automation Platform

Red Hat Advanced Cluster Management for Kubernetes

Red Hat Insights

Red Hat Satellite

Red Hat CodeReady

Red Hat Integration

Red Hat Runtimes

Red Hat Process Automation

Red Hat Data Services

Red Hat OpenShift

Red Hat Enterprise |

Red Hat Virtualiza

Red Hat OpenStack Platform

aws

Google Cloud

IBM Cloud

Microsoft Azure

Other public clouds

Edge

Red Hat OpenShift Data Foundation

Red Hat Enterprise Linux

Red Hat Enterprise Linux Solutions

For Small / Medium institutions

- Use RHEL with NFS and/or Samba for file sharing
  - Uses Kerberos for authentication / authorization
  - Implements access controls use ACLs and SELinux labels
- Encrypt data at rest with LUKS and mange with NBDE
  - Provides consistent encryption on-premise or in cloud environments
  - Manage LUKS keys using Network Bound Disk Encryption
- Encrypt traffic using IPSec or TLS and leverage FIPS-validated cryptography

For Enterprises

- Increase data availability with High Availability clustering and Resilient Storage
- Authenticate and manage digital certificates with Identity Manager
- Verify data integrity using AIDE and Application Allowlisting (fapolicyd)

Red Hat Enterprise Linux Security Hardening guide

https://access.redhat.com/documentation/en-us/red_hat_enterprise_linux/8/html/security_hardening/

Red Hat Cloud Storage and Data Services

For Small / Medium institutions

- CephX authentication between client and storage system and users and daemons
- Defaults to separate networks for cluster and user traffic
- Uses FIPS validated cryptographic modules when running on RHEL
- Support for encryption of data on the disk using LUKS encryption of data on OSDs

For Enterprises

- Full spectrum of data at rest encryption and user authentication options
  - User provided keys, Vault and KMIP support, Server managed encryption and LDAP support
  - OpenStack encryption key management support with Barbican integration
- S3 Object lock API support for WORM capabilities
- Encryption support for of inter-cluster traffic with Ceph messenger V2
- OpenShift PV and cluster wide encryption with KMIP support in ODF

Red Hat storage data security and hardening guide:

https://access.redhat.com/documentation/en-us/red_hat_ceph_storage/4/html/data_security_and_hardening_guide/index

Red Hat Hybrid Cloud Solutions

Red Hat Ceph Storage and OpenShift Data foundation

- AWS S3 compliant API for application portability
- Time based credential and data set sharing with AWS STS support with Ceph object gateway (RGW)
- Multi cloud API, security, encryption and data federation support from single access API access point with Multi Cloud Gateway (MCG - NooBaa)

Red Hat Enterprise Linux

- Separate workloads via VMs or Containers
  - Leverages SELinux labeling, cGroups & processor affinity
- Encrypt data at rest with LUKS and mange with NBDE
  - Manage cloud encryption keys from on-premise devices
- Encrypt inner-cluster traffic with TLS
- Leverage HA and Resilient storage for critical applications

Resources

Red Hat product security
secalert@redhat.com

Customer Portal
access.redhat.com/security

Red Hat Enterprise Linux hands-on lab
lab.redhat.com

Red Hat Enterprise Linux 8
redhat.com/rhel

Red Hat Ceph Storage
redhat.com/ceph

Thank you

Red Hat is the world's leading provider of enterprise open source software solutions. Award-winning support, training, and consulting services make Red Hat a trusted adviser to the Fortune 500.

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