Project Diamond Bluff

Building an open ecosystem for composable compute infrastructure

Kris Murphy
Project Lead, Office of CTO, Red Hat

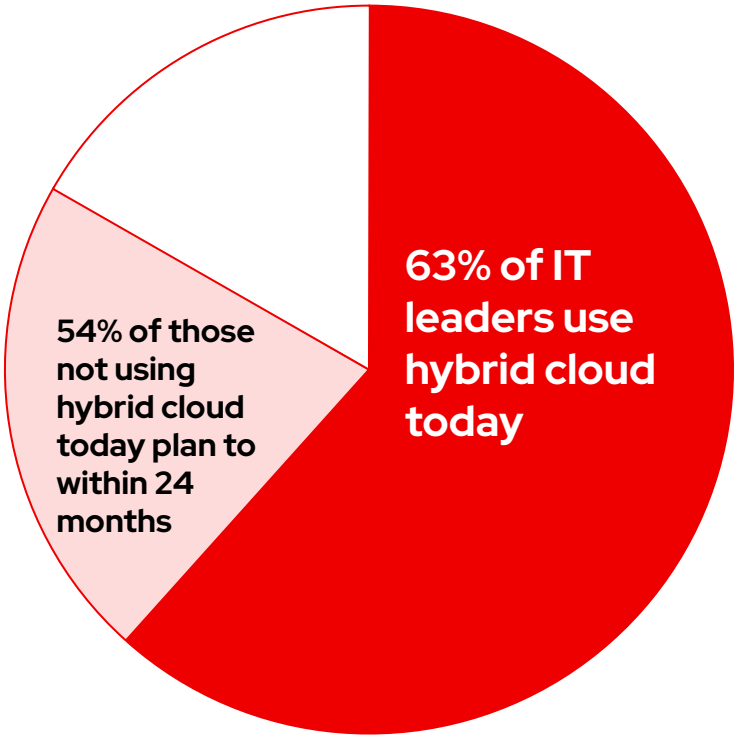
Yan Fisher
Global Evangelist, Red Hat

Hybrid Cloud is the Predominant Operational Paradigm

Public cloud

Private cloud

Edge



Virtual

Bare metal

Source: Red Hat, 2020 State of Enterprise Open Source Report.

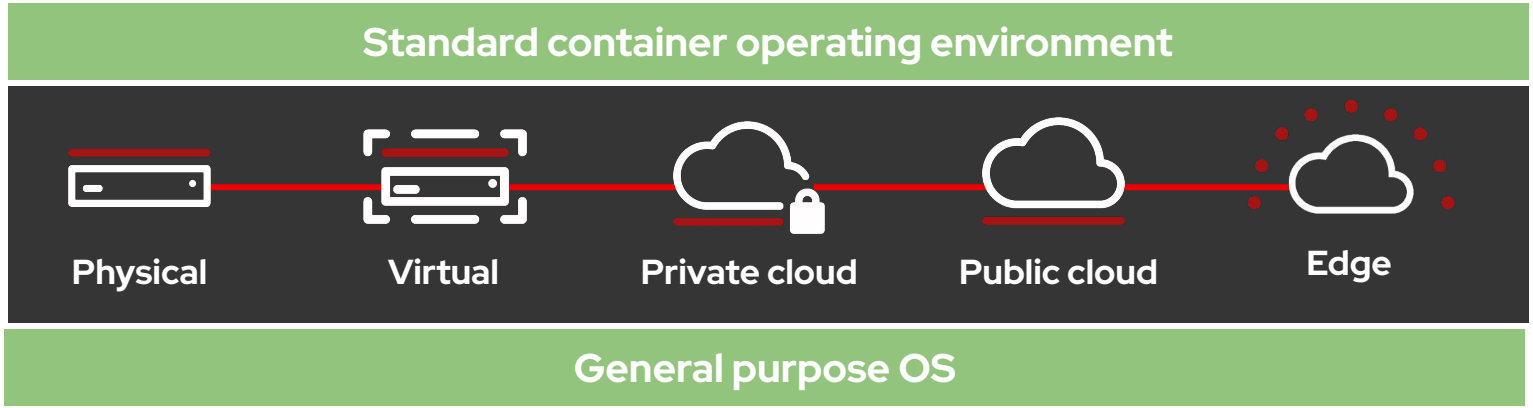
The Hybrid Cloud Data Center

Everything-as-a-Service

Modern apps

Containers and microservices

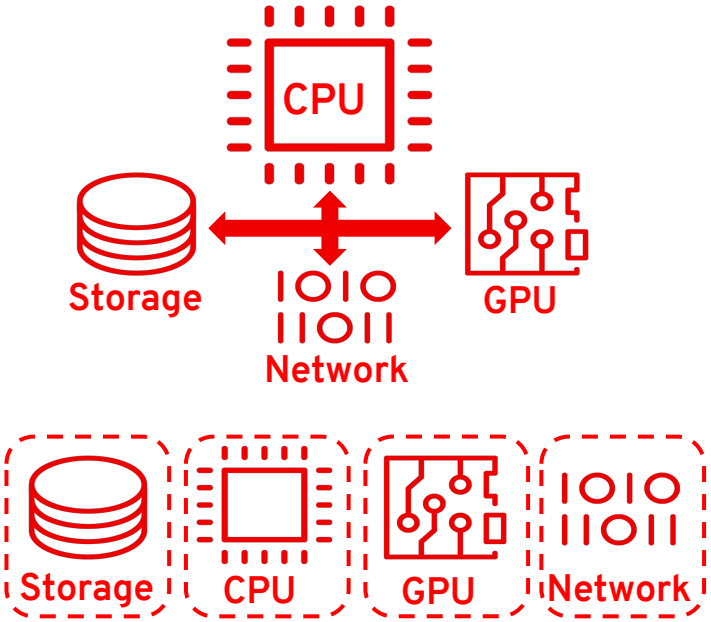
ISVs



Architectural Compartmentalization and Domain-Specific Hardware

- Mismatch of software to hardware abstractions and trust boundaries
- Hypervisors are unable to effectively abstract domain-specific hardware

Disaggregated and Composable System Architecture



Move from CPU-centric architecture to collection of independent devices and SW-defined device functions

New chapter in modern system architecture

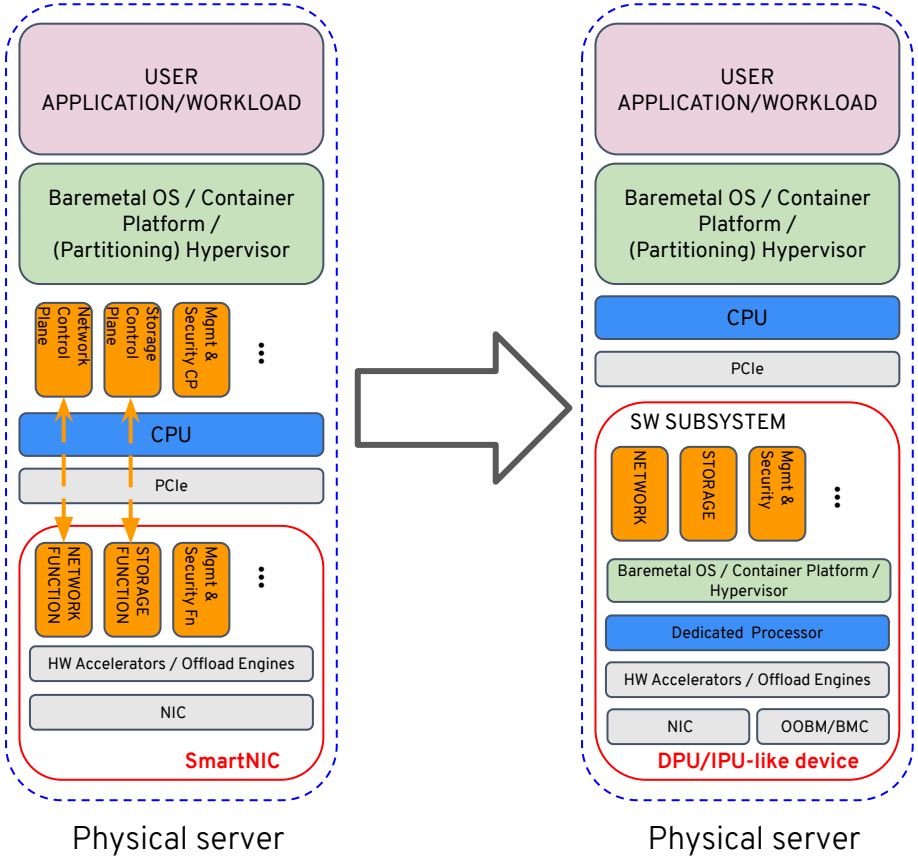
Key characteristics of this new architecture include:

- Presence of their own general purpose processor
- The ability to boot a general purpose OS
- Domain-specific HW acceleration capabilities
- Software-defined device functions that allow the software components deployed to them to define the device's functions that are presented to the host
- Offloading of whole software subsystems, such as the Networking or Storage stack, including their control planes
- Strict security isolation from the host on the hardware-level
- Unique network identity
- Out-of-band management where the DPU/IPU-like device is managed separately from the server where it resides or the DPU/IPU-like device can be used to manage the server

Generalized example of a new system architecture

Traditional SmartNIC model

- Computer is CPU + SmartNIC as peripheral that is fully controlled by the CPU
- CPU + domain-specific HW acceleration
- Static device function



DPU/IPU-like model

- NIC & HW accelerators move to DPU with own CPU
- Software defined device function
- Computer is an aggregation of independently intelligent subsystems

Project Diamond Bluff - Vision Statement

*The objective of the **Diamond Bluff** project is to foster a **community-driven standards-based open ecosystem** for next generation architectures and frameworks **based on DPU/IPU-like technologies**.*

Goals

- Define DPU/IPU/other device characteristics required for compatibility with the Diamond Bluff project
- Create framework(s) and architecture for DPU/IPU-based software stack(s) applicable to any vendors hardware solution
- Create APIs for interaction with and between the elements of the DPU/IPU ecosystem
    - DPU/IPU hardware
    - DPU/IPU hosted applications
    - Host Node
    - Remote provisioning software
    - Remote orchestration software

Structure and Governance

- Current working groups within the project
  - Org Group
  - Vision Statement/Goals
  - Developer Platform
  - More are being defined ...
- Not yet associated with a foundation
- Looking for more contributors that share our goals and vision to join us

THANK YOU!