ARM in IOT

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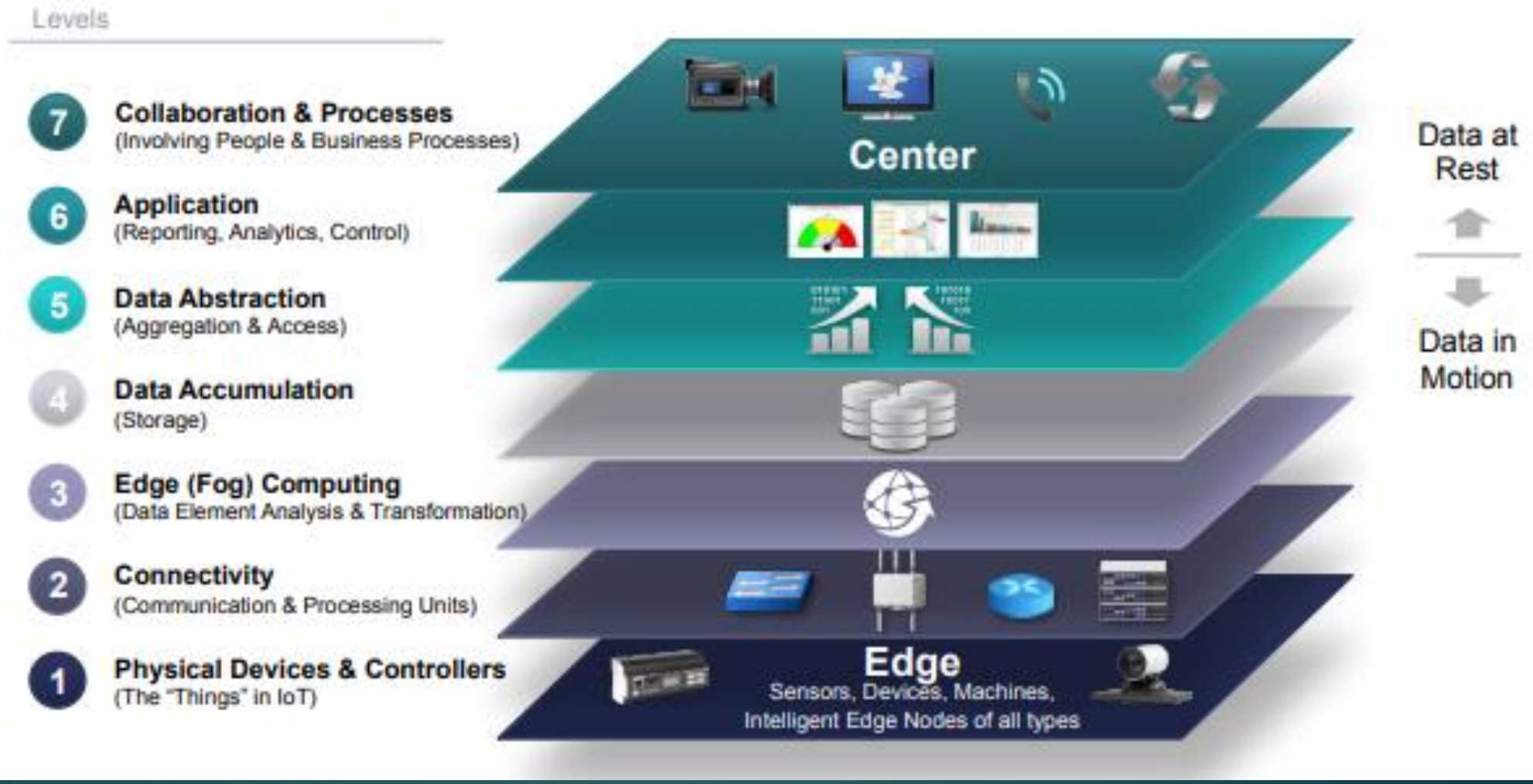
- The IoT Reference Model aims at establishing a common grounding and a common language for IoT architectures and IoT systems
- In an IoT system, data is generated by multiple kinds of devices, processed in different ways, transmitted to different locations, and acted upon by applications.
- IoT reference model is comprised of seven levels. Each level is defined with terminology that can be standardized to create a globally accepted frame of reference.
- The IoT Reference Model does not restrict the scope or locality of its components. For example, from a physical perspective, every element could reside in a single rack of equipment or it could be distributed across the world.
- The IoT Reference Model also allows the processing occurring at each level to range from trivial to complex, depending on the situation.
- The model describes how tasks at each level should be handled to maintain simplicity, allow high scalability, and ensure supportability. Finally, the model defines the functions required for an IoT system to be complete.

Requirement……

- Connectivity and communications
- Device management
- Data collection, analysis, and actuation
- Scalability
- Security
- HA
- Predictive analysis
- Integration

Ref: https://wso2.com/whitepapers/a-reference-architecture-for-the-internet-of-things/

Internet of Things Reference Model



Ref:
http://cdn.iotwf.com/resources/71/IoT_Reference_Model_White_Paper_June_4_2014.pdf

Level 1: Physical Devices and Controllers

physical devices and controllers that might control multiple devices. These are the "things" in the IoT, and they include a wide range of endpoint devices that send and receive information.

Level 2: Connectivity

Communications and connectivity are concentrated in one level that is Level 2.

- timely information transmission. This includes transmissions:
- Between devices (Level 1) and the network
- Across networks (east-west)
- Between the network (Level 2)

Level 3: Edge (Fog) Computing

The functions of Level 3 are driven by the need to convert network data flows into information that is suitable for storage and higher level processing at Level 4 (data accumulation). So Level 3 activities focus on high-volume data analysis and transformation

That include

- Evaluation: Evaluating data for criteria as to whether it should be processed at a higher level
- Formatting: Reformatting data for consistent higher-level processing
- Expanding/decoding: Handling cryptic data with additional context (such as the origin)
- Distillation/reduction: Reducing and/or summarizing data to minimize the impact of data and traffic on the network and higher-level processing systems
- Assessment: Determining whether data represents a threshold or alert; this could include redirecting data to additional destinations

Level 4: Data Accumulation

- Level 4 captures data and puts it at rest, it is now usable by applications on a non-real-time basis. Applications access the data when necessary.
- Level 4 converts event-based data to query-based processing. This is a crucial step in bridging the differences between the real-time networking world and the non-real-time application

- If data is of interest to higher levels: If so, Level 4 processing is the first level that is configured to serve the specific needs of a higher level.
- If data must be persisted: Should data be kept on disk in a non-volatile state or accumulated in memory for short-term use?
- The type of storage needed: Does persistency require a file system, big data system, or relational database?
- If data is organized properly: Is the data appropriately organized for the required storage system?
- If data must be recombined or recomputed: Data might be combined, recomputed, or aggregated with previously stored information, some of which may have come from non-IoT sources.

Level 5: Data Abstraction

- IoT systems will need to scale to a corporate—or even global—level and will require multiple storage systems to accommodate IoT device data and data from traditional enterprise ERP, HRMS, CRM, and other systems.
- The data abstraction functions of Level 5 are focused on rendering data and its storage in ways that enable developing simpler, performance-enhanced applications.

For these reasons, the data abstraction level must process many different things.

These include:

- Reconciling multiple data formats from different sources
- Assuring consistent semantics of data across sources
- Confirming that data is complete to the higher-level application
- Consolidating data into one place (with ETL, ELT, or data replication) or providing access to multiple data stores through data virtualization
- Protecting data with appropriate authentication and authorization
- Normalizing or denormalizing and indexing data to provide fast application access

Level 6: Application

Level 6 is the application level, where information interpretation occurs. Software at this level interacts with Level 5 and data at rest, so it does not have to operate at network speeds

Level 7: Collaboration and Processes

In IOT people must be able to communicate and collaborate, sometimes using the traditional Internet, to make the IoT useful. Communication and collaboration often requires multiple steps. And it usually transcends multiple applications. This is why Level 7, as shown in Figure 9, represents a higher level than a single application.