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DOMAIN DRIVEN DESIGN OF BIG DATA SYSTEMS

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Big Data Design (Domain Driven Approach)

Architecturally Significant Requirements for Big Data Systems

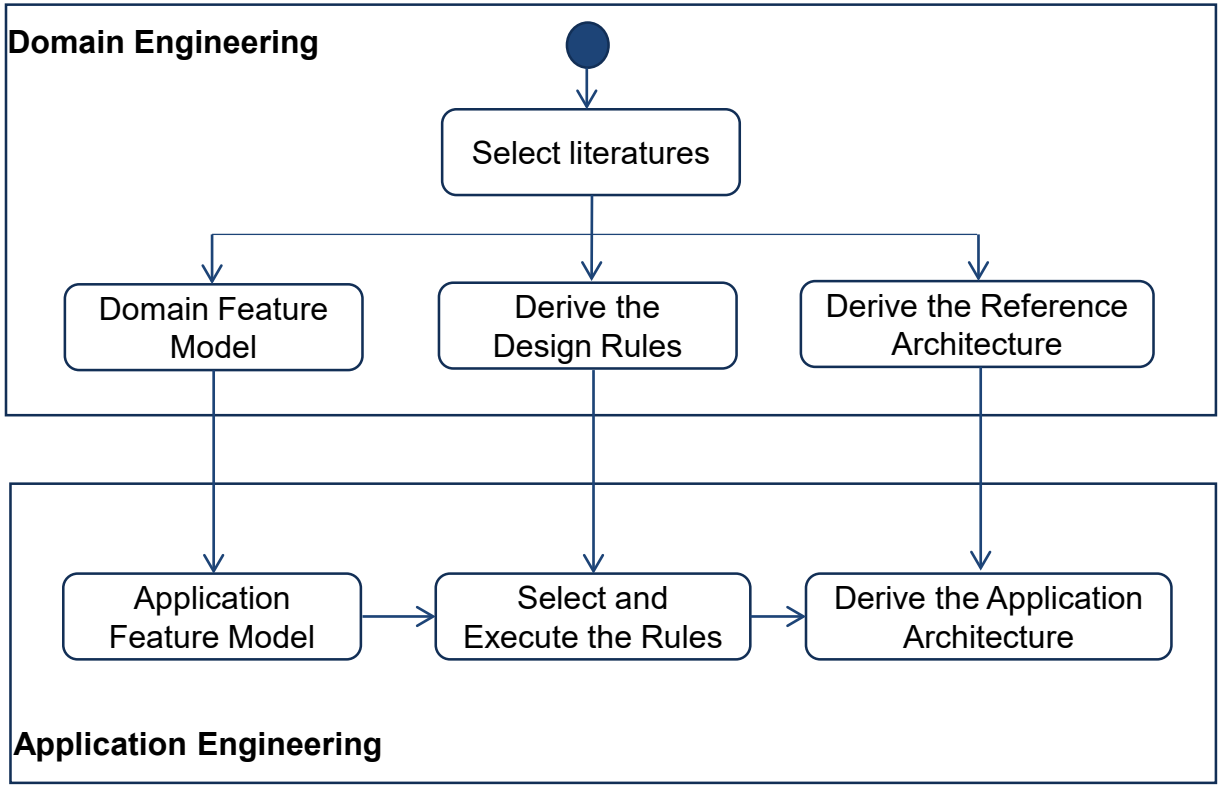
Conclusion

Big Data Design (Domain Driven Approach)

Based on

- Feature model (defines common and variant features of a domain)
- Design Rules (requirements and use-cases)
- Non-functional requirements (quality attributes)

Big Data Design (Domain Driven Approach)



Reference Architecture

Reference Architecture is an **abstraction** of ‘real’ architectures.

According to Muller,

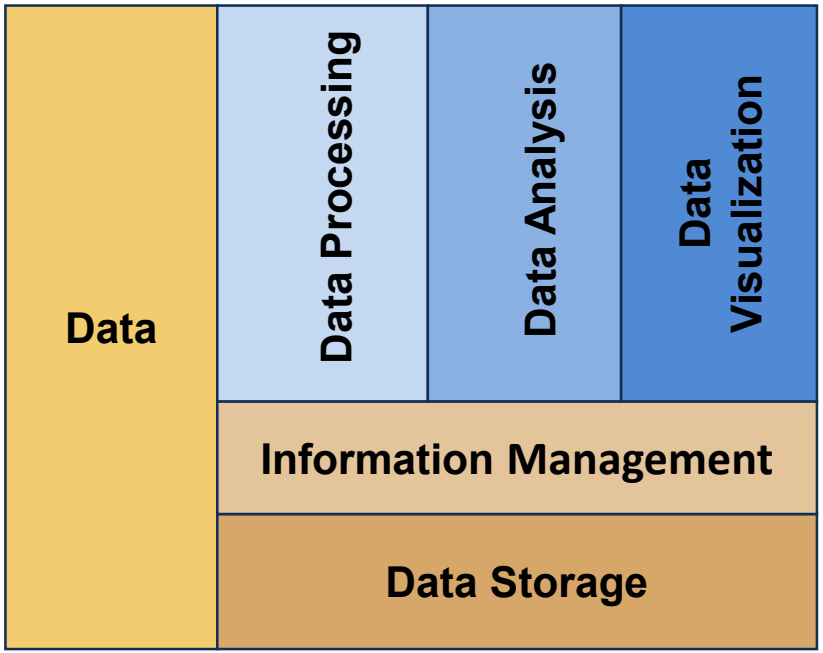
“architects can use a reference architecture as **guidance to create a concrete architecture** for their organization, business context and technology”

Reference Architecture

Important Observations:

1. Core of a big data architecture
   - Parallel batch processing engine (Hadoop MapReduce)
   - Distributed File system (HDFC)
   - NoSQL database (Hbase)
2. Other components
   - Querying engine
   - Predictive Analytics engine
   - Statistical Analysis / ML engine
   - Data importing engine
   - Real time / complex event processing engine
3. Architecture principles
   - Loose coupling
   - Cloud computing
   - Scalability
4. Best practices
   - Data pipeline approach
5. More consensus about the hardware and software than the principles and best practices

Big Data Design (Domain Driven Approach)



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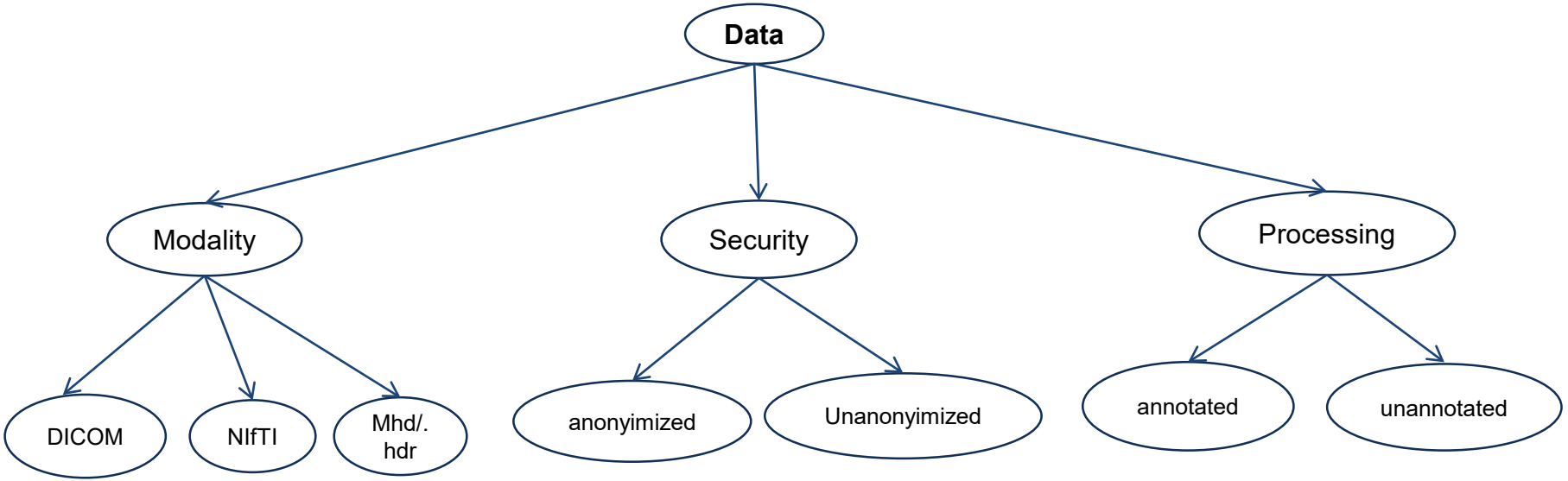

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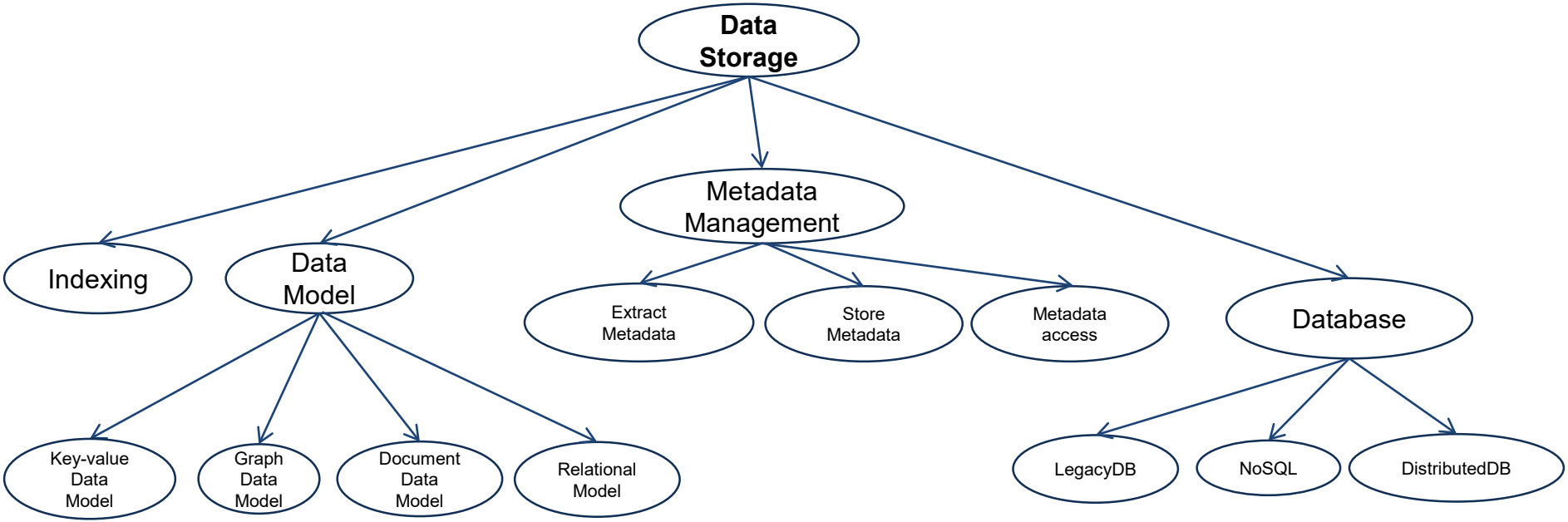

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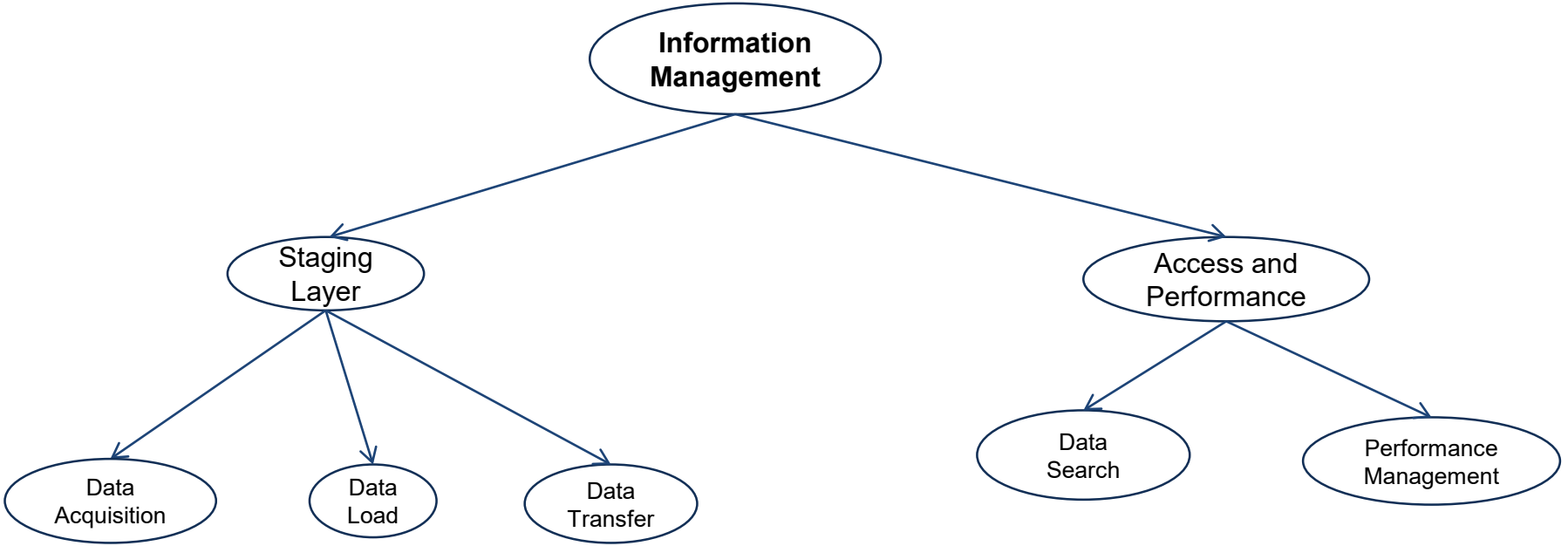

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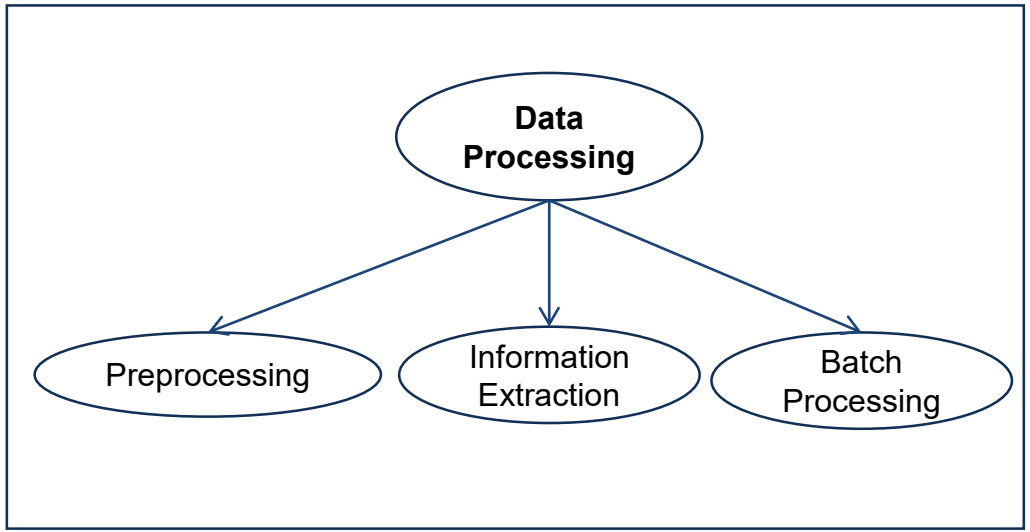

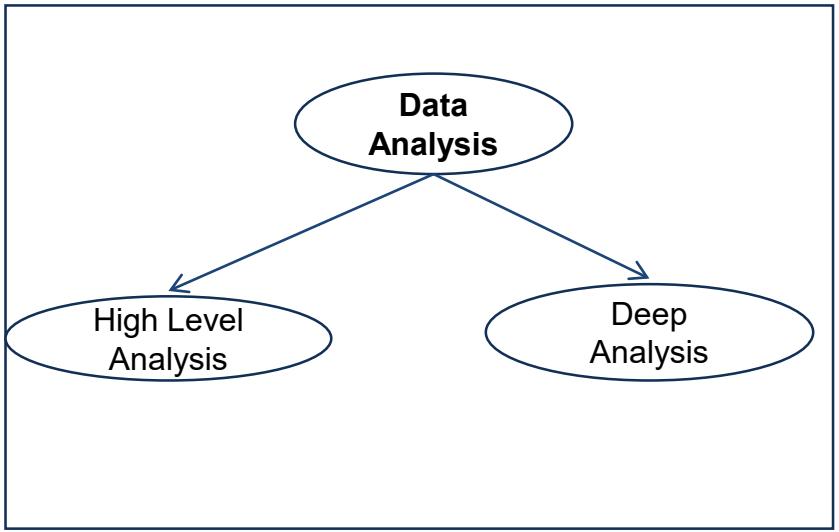

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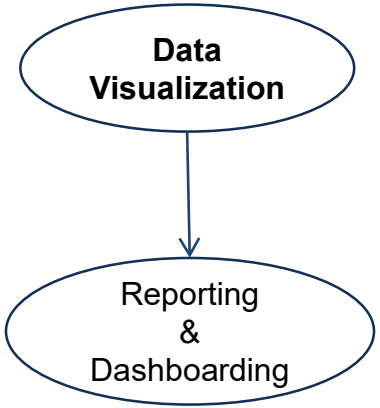

Design Rule Modeling

According to Design Rule Definition Language

“**if <feature> is selected then [action] <feature> on node [name]**”

DR1: If ***MULTIPLE DATA TYPES*** is selected then load ***METADATA MANAGEMENT*** on component DATA STORAGE

DR2: If ***KEY-VALUE DATA MODEL*** is selected then load ***NoSQL*** on component DATA STORAGE

DR3: If ***STREAMING*** is selected then load ***DATA ACQUISITION*** on component INFORMATION MANAGEMENT

Architecturally Significant Requirements for Big Data Systems

- The **Five Vs** - **V**olume, **V**elocity, **V**ariety, **V**eracity and **V**alue
- **Hyper-scalability** - able to support an exponential growth in computing requests even though the available resources only grow linearly
- **Resilience** – need to identify attacks and react to those circumstances
- **Privacy and Security** – ability to reliably control, monitor and audit who can perform what actions on the resources

Conclusion

- Select the **feature model** which covers the common and variant features of a broad set of different applications
- Integrate the **design rules** in the overall process in deriving a feasible big data architecture
- Use the **reference architecture** for deriving concrete application architectures

Serial No.	List of Papers to derive the reference architecture of Big Data Systems
1	B. Geerdink, “A Reference Architecture for Big Data Solutions”
2	C. Ballard et al., Information Governance Principles and Practices for a Big Data Landscape. IBM Redbooks, 2014
3	D. Chapelle, “Big Data & Analytics Reference Architecture.” An Oracle White Paper (2013)
4	M. Maier, A. Serebrenik, and I.T.P. Vanderfeesten, “Towards a Big Data Reference Architecture.” (2013)
5	NIST Big Data PWG, Draft NIST Big Data Interoperability Framework: Volume 6, Reference Architecture (2014)
6	N. Marz, and J. Warren, “Big Data: Principles and best practices of scalable realtime data systems.” Manning Publications Co. (2015)
7	Oracle, Information Management and Big Data A Reference Architecture, An Oracle White Paper, February (2013)
8	P. Pääkkönen, and D. Pakkala, “Reference Architecture and Classification of Technologies, Products and Services for Big Data Systems.” Big Data Research (2015)
9	S. Soares, “Big Data Governance.” Information Asset, LLC (2012)