HITACHI
Inspire the Next

Pentaho Data Integration Best Architecture Practices

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Introduction:
What is “Data Integration Architecture?”

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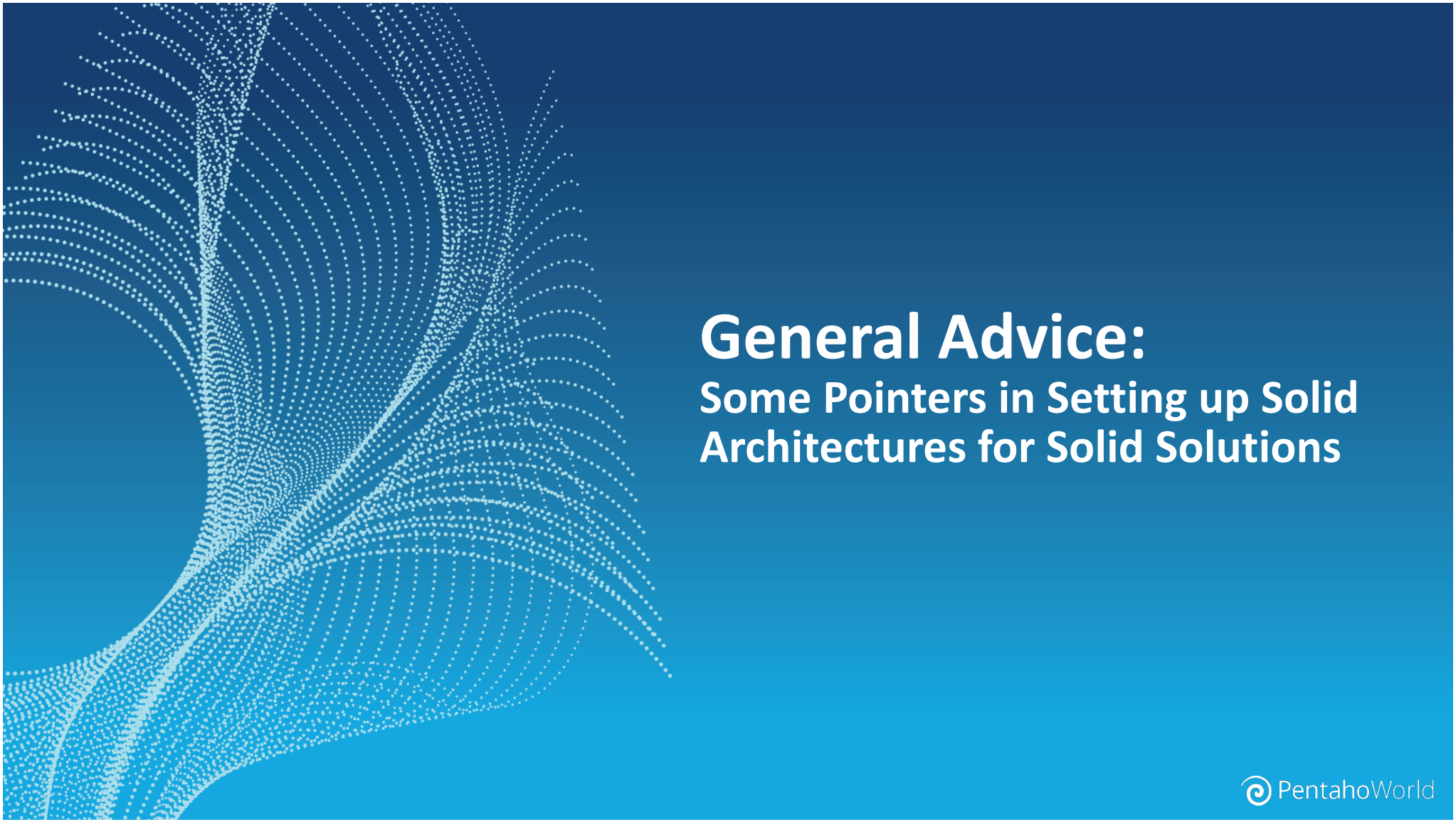
Introduction

- What is “data integration architecture”?
  - **High level view on a (potential) DI solution**
  - **Describes components and their relationships**
  - **Taking into account all parts**
  - **Avoiding details without skipping anything**

Introduction

- Why do you need an architecture?
  - **Solutions get very complex**
  - **Teams of engineers get large**
  - **Conscious decisions on use of solution components**
  - **Holistic views on security, quality, transparency, performance**
  - **Allows for validation of high level requirements**
  - **Allows for the creation and validation of scenarios**
  - **Clearly defines stakeholders**


General Advice:
Some Pointers in Setting up Solid Architectures for Solid Solutions
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General Advice – Don’t Forget the Details…

- Learn the basics of the building blocks…
  - **PDI Best Practices #PWorld14**
    - **Standards, naming, …**
  - **PDI Best Governance Practices #PWorld15**
    - **PM, CI, VCS, Testing, …**
  - **Get expertise for all software components you use**

General Advice – Whiteboarding

- Whiteboarding
  - **Is done with interested stakeholders**
  - **Tries to compromise knowledge from various parties**
  - **Allows for quick high level design**
  - **It is just a starting point!**
  - **Needs to get followed up, validated against scenarios**
  - **Forget conviction: time to change your mind**

General Advice – Scalability

- Parallelize on a high level
  - Aggressive low level parallelization can get you into trouble
- Remember to allow data to flow in swim lanes
  - Parallelization of as much as possible
  - “Sharding” and so on should be architected in
- Identify time window early on, assess HW needs

General Advice – Transparency

- Great complexity requires transparency
  - Something will always go wrong
  - At the worst possible time
- As a rule:
  - always trace data moving between parts of architecture
  - When in doubt: add more logging, tracking and tracing
- Use components in architecture that allow for monitoring
  - Prefer servers that allow you to see what's going on

General Advice – Predictability

- Enormous workloads, batch jobs, put systems under stress
- Batches tend to grow bigger over time, causing more stress
- As a rule:
  - If you can in any way, use micro-batching
  - Chop up 1 large nightly workload into hundreds of small ones throughout the day
- Advantages:
  - More frequent updates
  - Predictable workload
  - Fail early scenario: problems are detected earlier


Specific Advice:
Advice for IoT and Others
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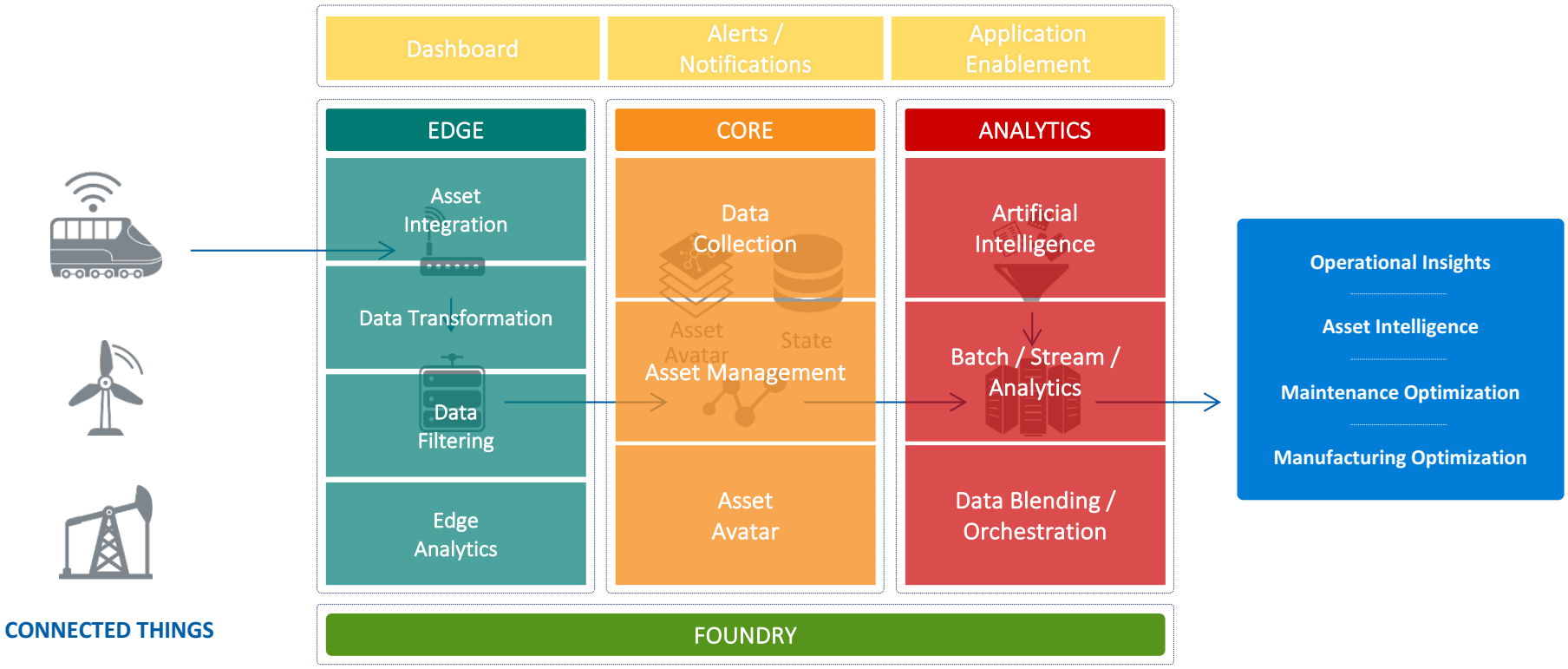
Specific Advice – Hadoop

- Hadoop has itself become an ecosystem of software
- Select the software in the ecosystem to fit your ideal architecture
- Only select properly supported components, avoid bleeding edge
- Combat lack of transparency with extensive logging
- Follow the right sizing for your architecture, balance correctly
- Use it as a scalable part, not just as a “Database”

Specific Advice – IoT

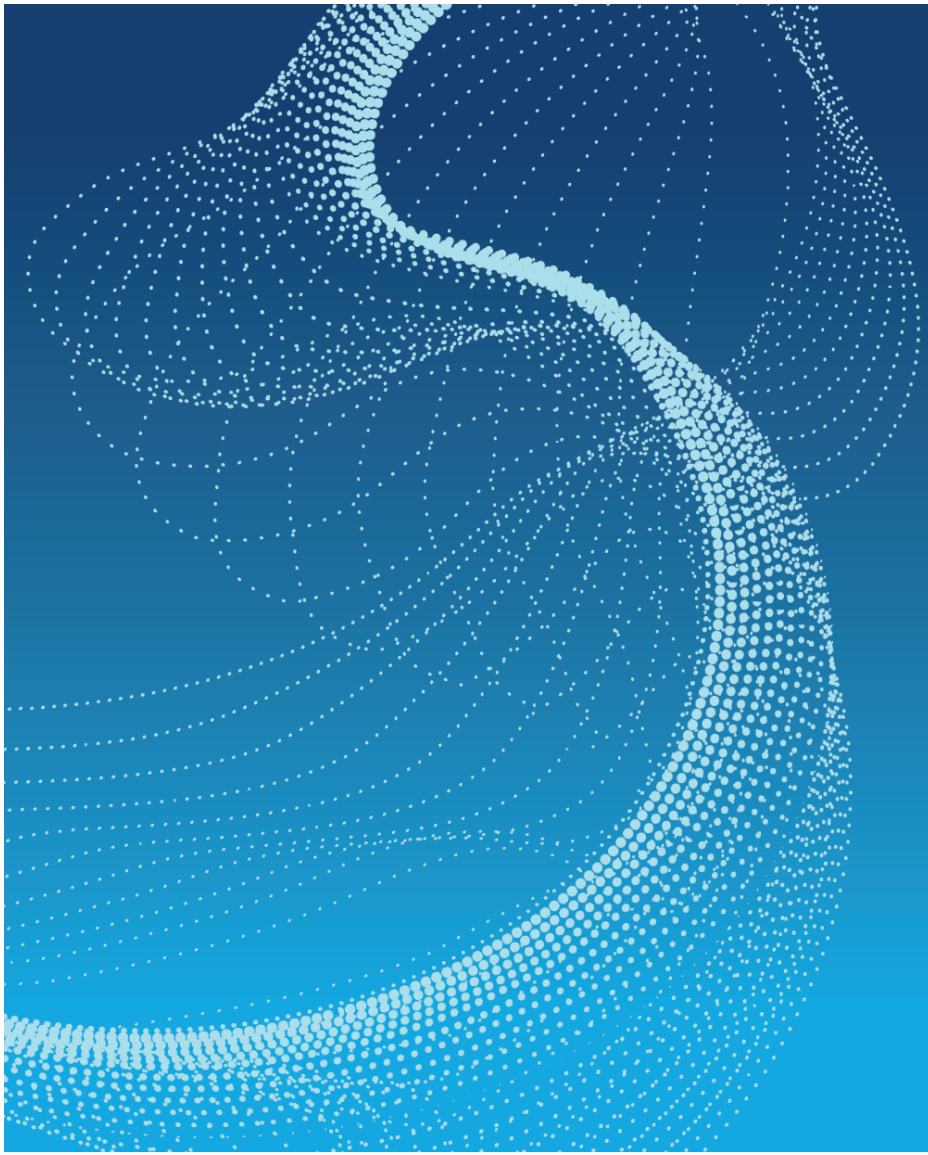
- IoT is Messy
  - Data Quality varying
  - Data Connectivity problems
  - Late arriving data
  - Flash-floods of data (low predictability)
  - High complexity
  - Varying data formats and versions
  - Number of different devices can be high

Hitachi Vantara IoT Offerings



Specific Advice – IoT

- Plan ahead for failure
- Use modern techniques like Metadata Injection
- Make extensive use of queues in any format
- Assume that things will go wrong in every scenario
- Design the architecture to cope with failures
- Design the architecture to report on statistics



Practical Examples:
War Stories from the Field

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Examples – Large Services Vendor

- Moving large amounts of small data packets around
- Picked the right tools, didn't pick an overall architecture
- Different teams "working together" in different countries
- Architecture became secondary to the overall solution
- Technology was selected not architecture

Examples – Large Services Vendor

- Carte servers got hammered thousands of times per second
  - Use of a specific scheduler was mandated
  - Running out of sockets, HTTP server buckling under the load
- Complaints about PDI startup times
- Overall performance too low
- Services called in to solve “critical” issues in our software

Examples – Large Services Vendor

- Don’t allow internal organizational needs drive the architecture
- Don’t allow technology choices to drive architecture
  - And if you too, handle the implications
- To scale, ramp up performance, always queue and intelligently handle queued tasks (not one at a time for example)
- The performance of the whole is determined by the slowest link
  - Consider this up-front in the architecture

Examples – Handling TV Set-top Data

- Periodic in nature, handling clicks
- Reading from MQTT, dumping data into Oracle for analysis
- Reported PDI performance trouble, services called in
- Small scale test, predicted ten-fold increase in size, already in trouble

Examples – Handling TV Set-top Data

- MQTT: great for queuing and IoT
- Not always possible to read in parallel from queues!
- Oracle is an RDBMS, kills parallelism in architecture

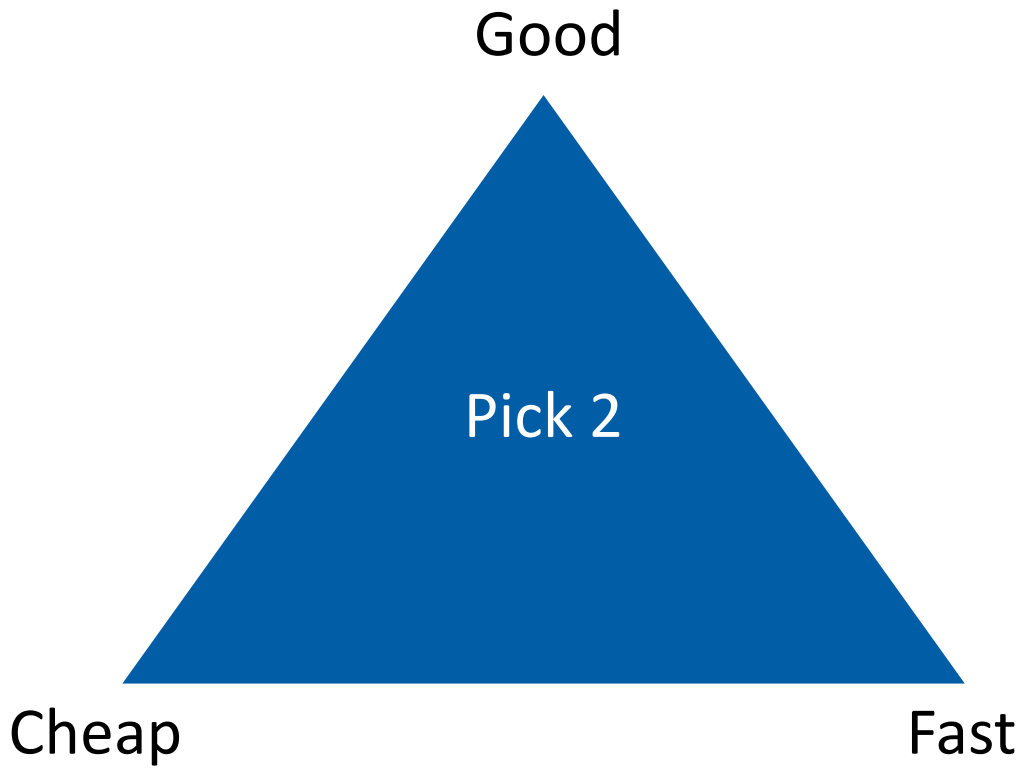
Examples – Handling TV Set-top Data

- Consider partitioning large amounts of clients
- Consider data extraction for any data storage mechanism

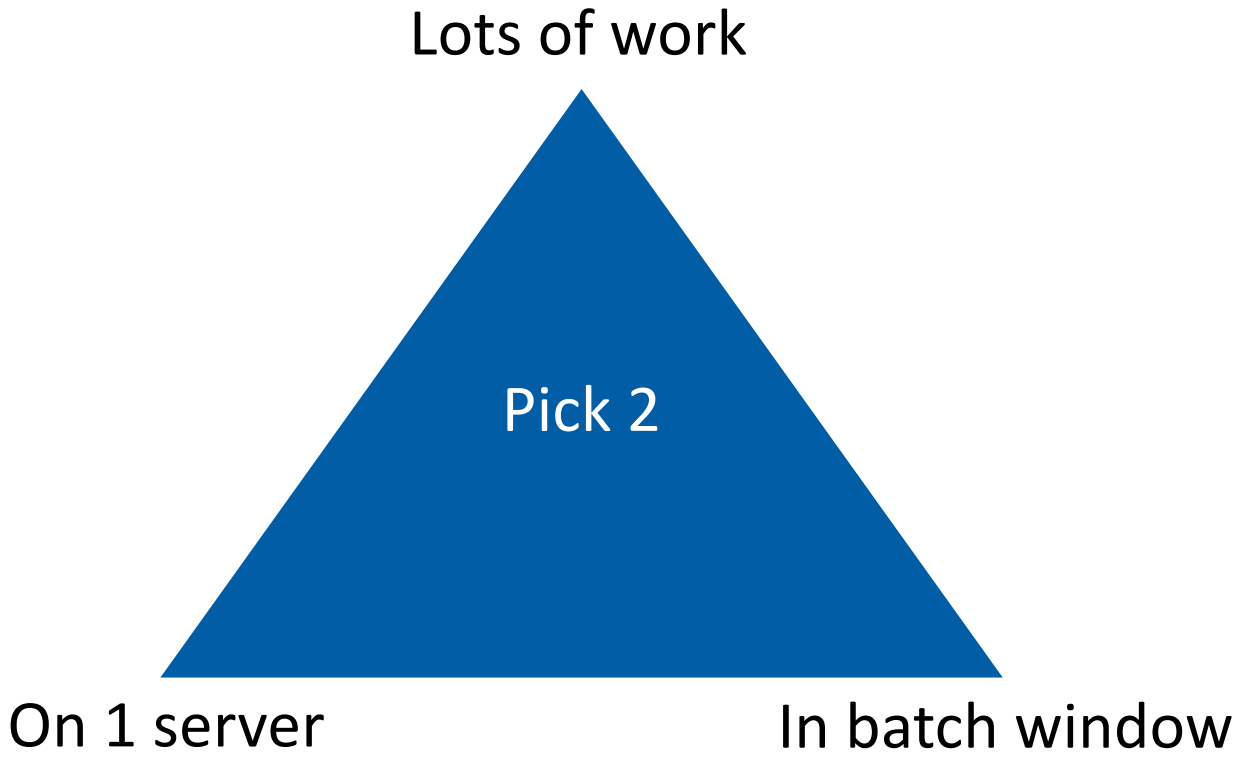
Examples – Big Bank

- Processed a gazillion records every night
- Had a batch window of 2 hours
- Got a monster computer to do the job with 64 cores
- Ran complex data quality validations in PDI, hundreds of steps
- Got into a performance problem
- Needed extensive performance tuning

Examples – Big Bank



Examples – Big Bank



Examples – Big Bank

- Consider up-front whether HW choices will pin you down later
- Weigh the importance of specific requirements into the architecture
  - time vs complexity vs hardware in this case


Recap:
PDI Best Architecture Practices
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Recap

- Make an architecture up-front, not as part of the documentation
- Be critical
- Be detailed
- Run scenarios against it
- Be ready to change your mind
- Get stakeholders involved
- Use PDI : Pessimistic Data Integration


Questions and
Discussion
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