

Embedding the cloud

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Do not ignore integration with clouds

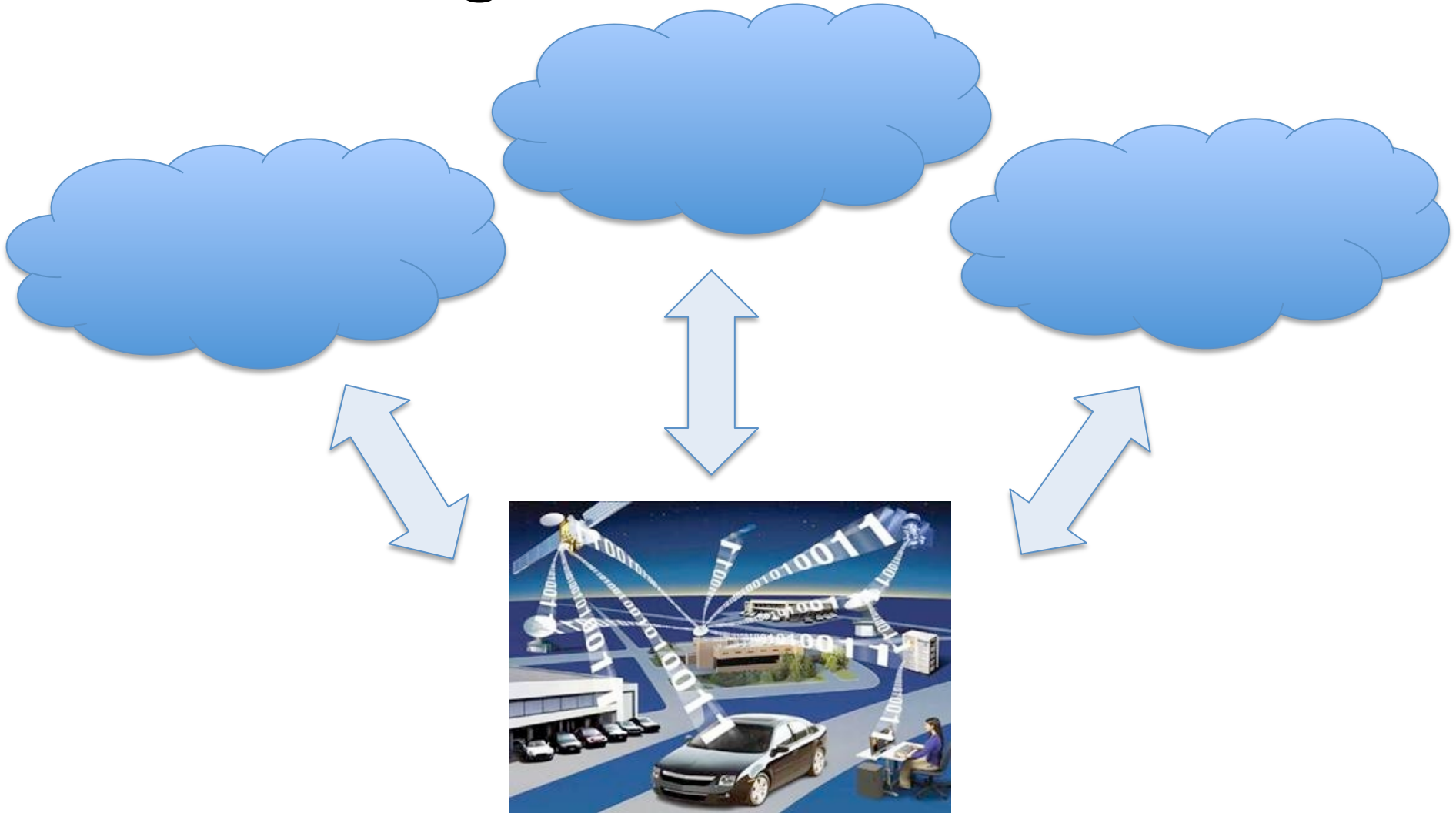


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Internet of Things

J. Gubbi et al. / Future Generation Computer Systems 29 (2013) 1645–1660



Fig. 1. Internet of Things schematic showing the end users and application areas based on data.

Valuable also for application-specific kernels/libraries

- gathering device-specific information and submitting it to further analysis
 - aggregation brings insights and may point to global patterns that need to be addressed
- global analysis may lead to changes on the kernels/libraries of certain devices

Off-loading likely to be relevant

- for certain operations, computation can be more efficiently (time, energy) carried out by sending the data to the cloud and waiting for the results
 - it depends on current device state
- opportunities also in computing nodes “closer” than the cloud
 - edge computing
 - wearable to mobile

“IoT + cloud” today:

(1) send everything to the cloud

- from “embedded systems as thin clouds” to “embedded systems” as sophisticated data source/sinks
- Following examples mentioned at Werner Vogel’s (Amazon) presentation at Qualcomm in March, 2014

Read [OUR GUIDING PRINCIPLES ON DATA AND PRIVACY](#) by David Friedberg, CEO of The Climate Corporation

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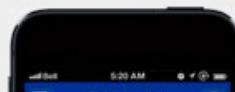
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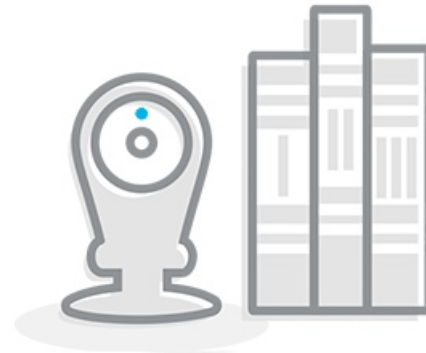
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1



2



3



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“IoT + cloud” today:

(1) send everything to the cloud

- Many scenarios are being wasteful in usage of backhaul pipelines

“IoT + cloud” today

(2) enable “real time” analytics

e.g. Amazon Kinesis

- SDKs for Java, JavaScript, .NET, Node.js, PHP, Python, Ruby
- on the data producer, look at PutRecord documentation:

Request Syntax

```
{  
  "Data": "blob",  
  "ExplicitHashKey": "string",  
  "PartitionKey": "string",  
  "SequenceNumberForOrdering": "string",  
  "StreamName": "string"  
}
```

Response Syntax

```
{  
  "SequenceNumber": "string",  
  "ShardId": "string"  
}
```

“IoT + cloud” today

(3) data management focus

- time series databases
- security, privacy, integrity

running low power, remember our cell phones

- Running low power
 - remember our cell phones
 - for people coming from linux servers background, speculation trade-offs differ significantly
- Data availability
 - remember all the data in our cars going to waste

Do not ignore integration with clouds

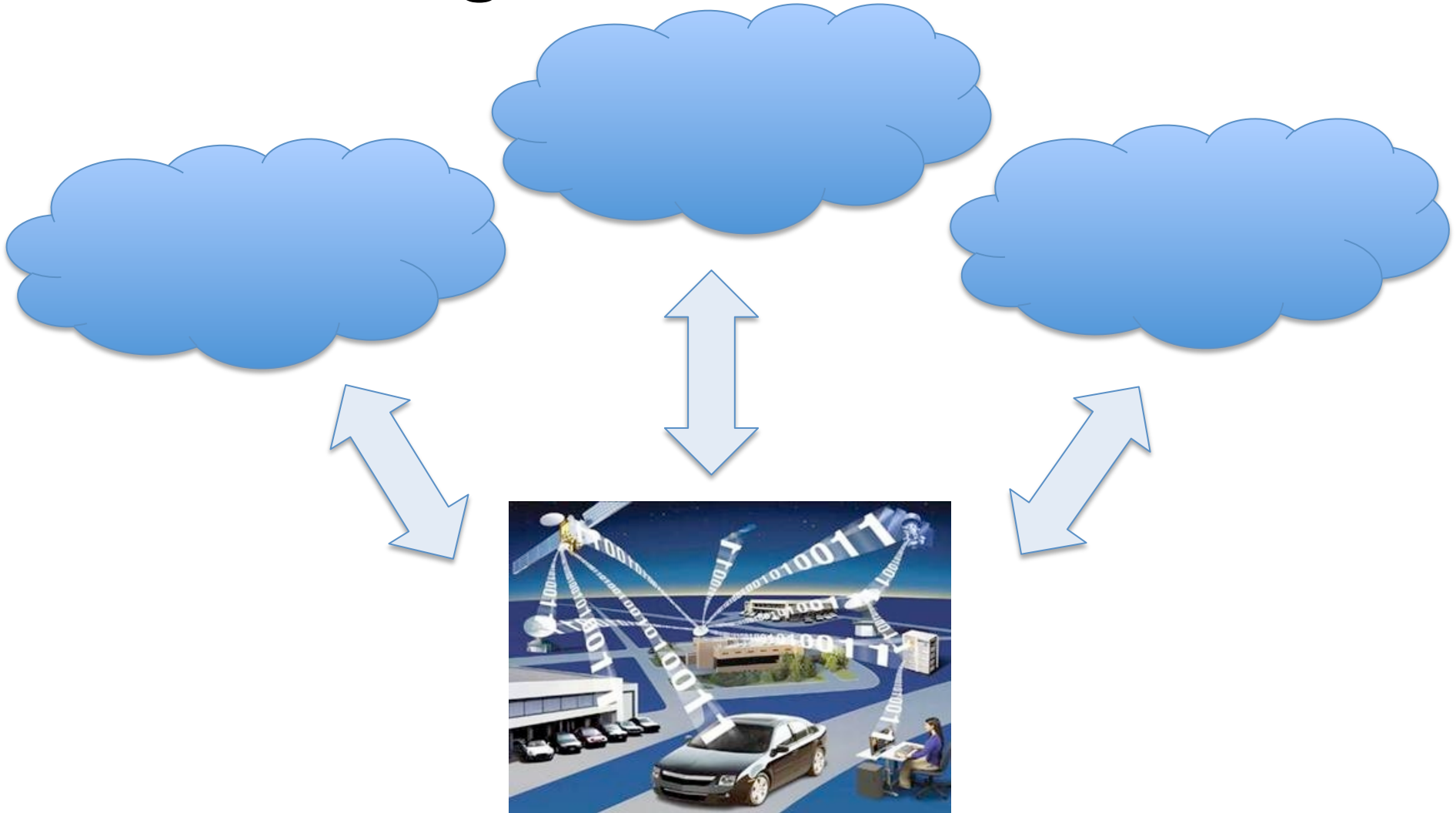


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