

ON BIG DATA MANAGEMENT IN IoT APPLICATIONS

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Outline

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The Data Flood

https://www.geek.com/geek-cetera/the-boeing-787-produces-over-500gb-of-data-during-every-flight-1542105,

GEEK.COM



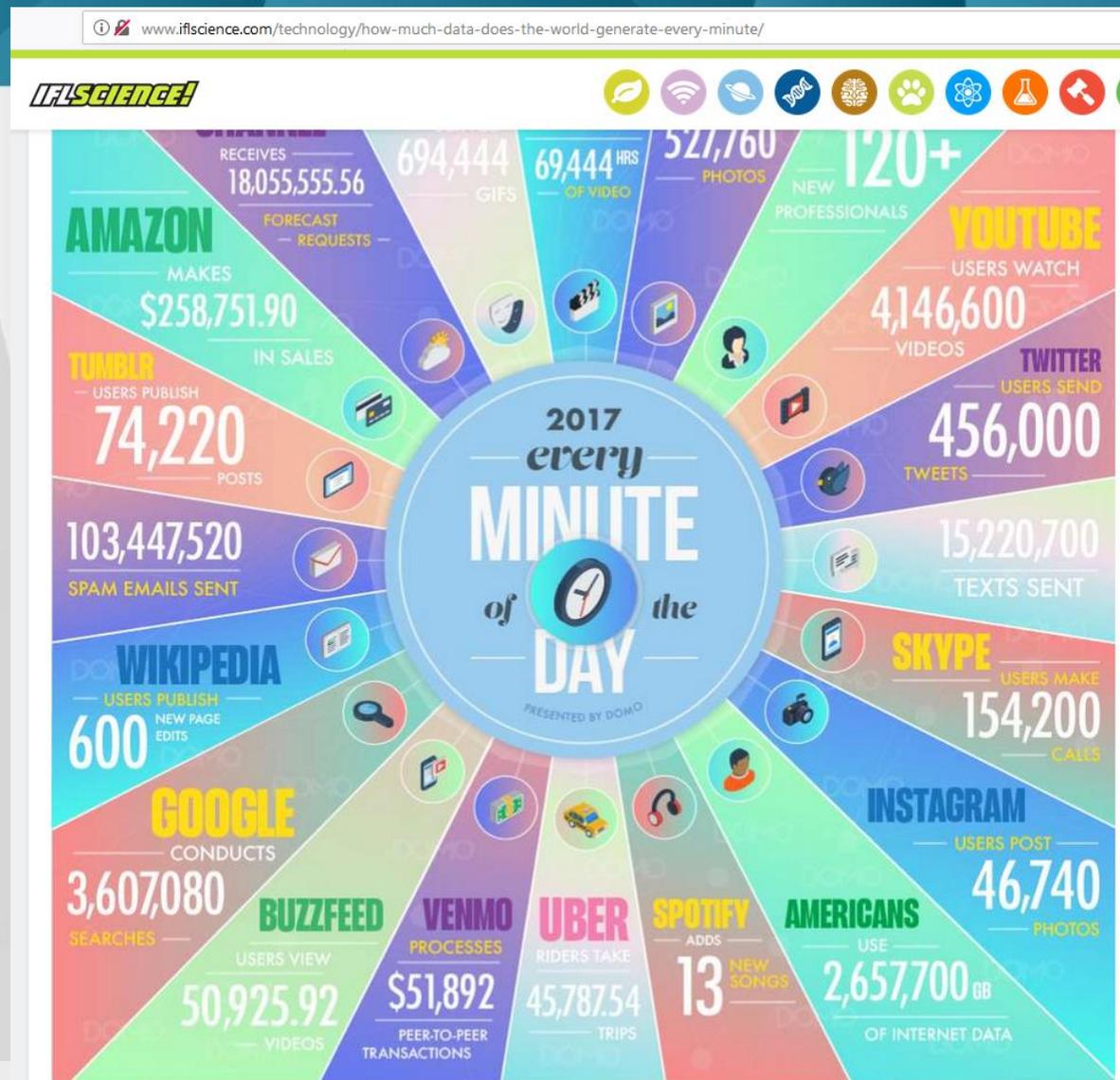
INCIDENT MANAGEMENT
for the Victors of Innovation

GEEK-CETERA

The Boeing 787 produces over 500GB of data during every flight

BY MATTHEW HUMPHRIES 03.07.2013 :: 7:26AM EST @MTHWGEEK

“Computers have promised us a fountain of wisdom, but delivered a flood of data” - Anthony G. Oettinger (American computer scientist)



Research Context

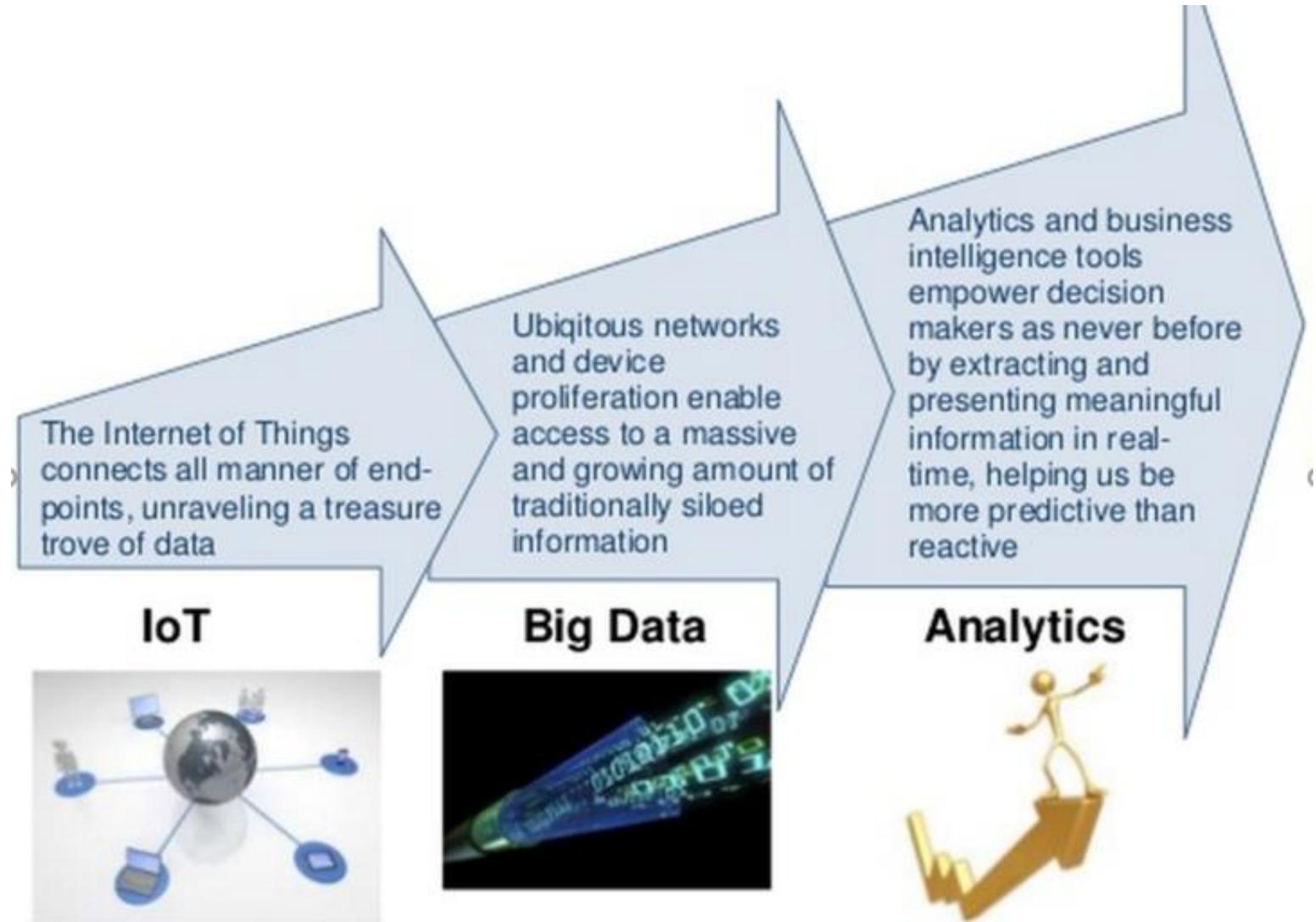
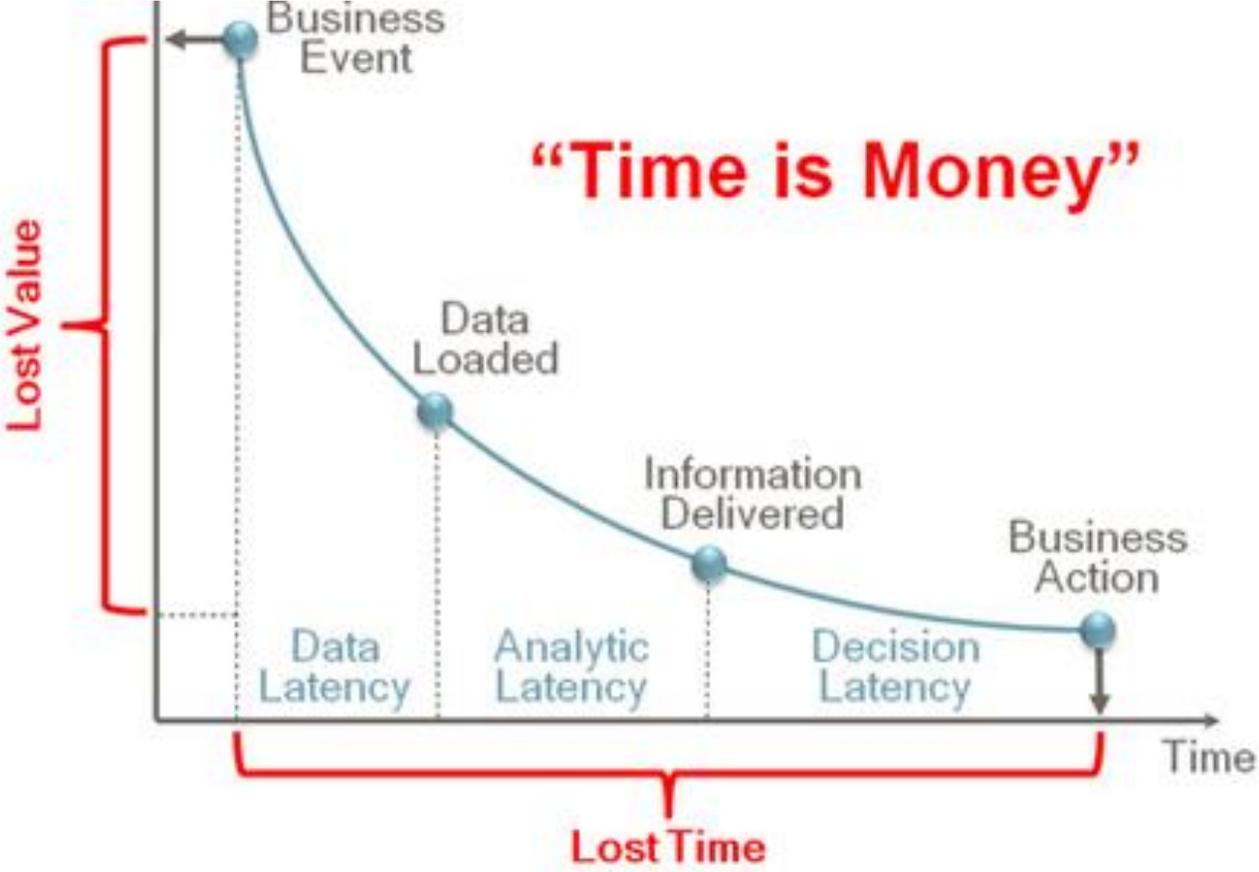


Image credit: Frost and Sullivan, 2013

The Latency Problem



The Problem Statement

- | We seek to develop a generic approach to processing high velocity, heterogeneous data typical of IoT applications to reduce the latency of intelligent reaction to actionable events and demonstrate this approach with a use case implementation

Traditional Data Management



Image Credit: Peter Pietzuch(2014)

Data Stream Management



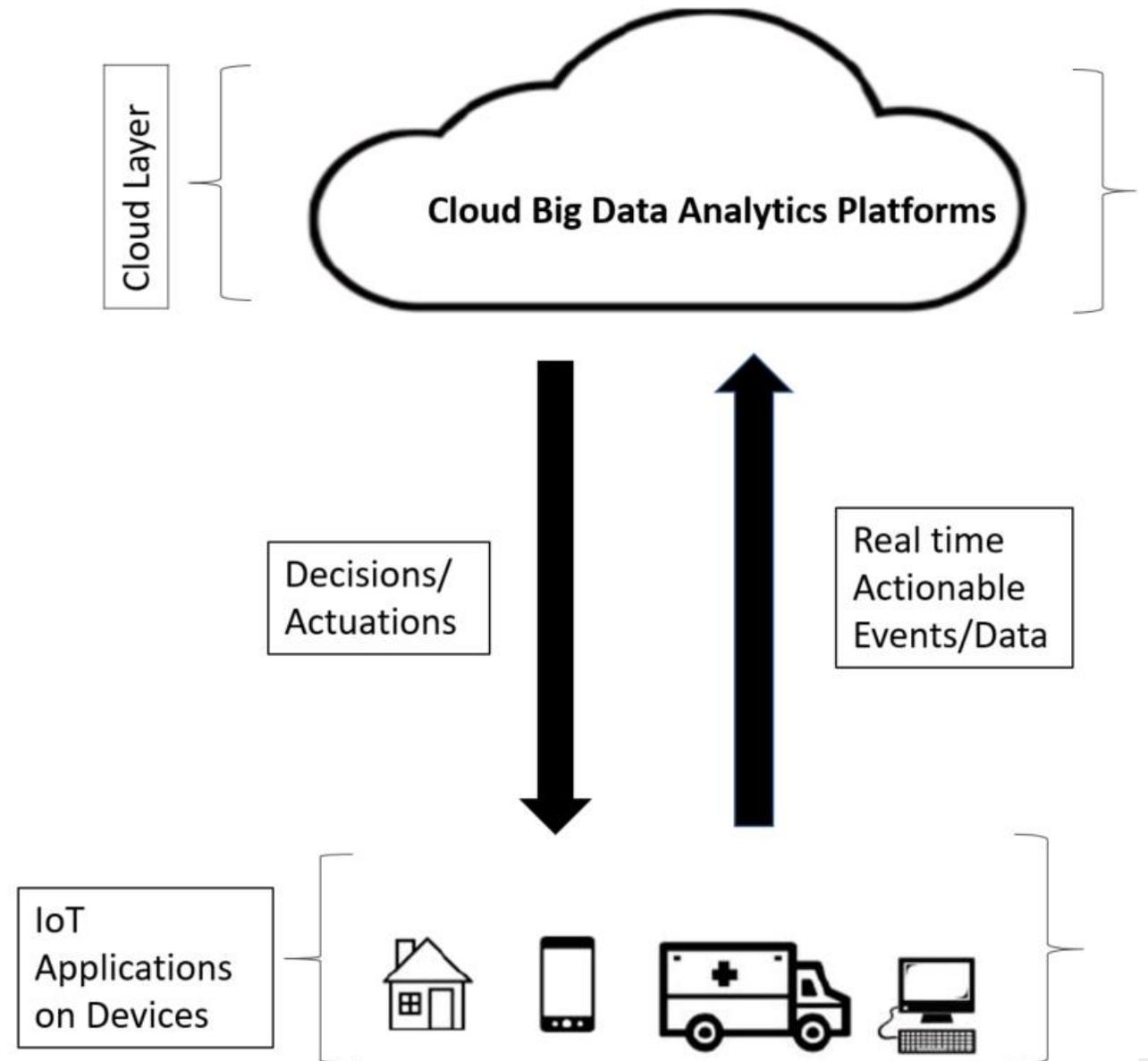
Image Credit: Peter Pietzuch(2014)

Related Works

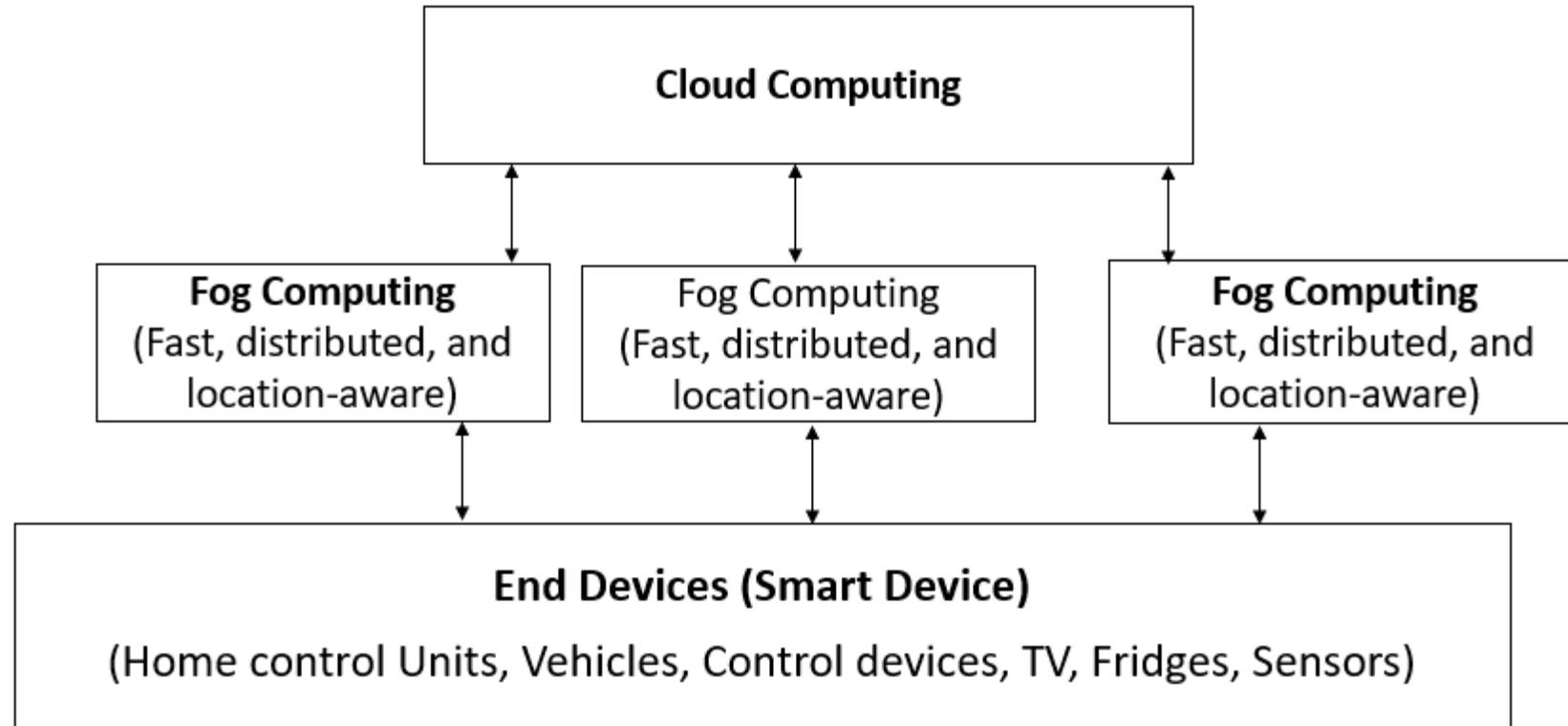
S/N	Author	Date	Conclusion(s)
1	Khan et al [13]	2015	cloud based data management and analysis approach using Hadoop and spark;
2	Khodadadi et al [8]	2015	Proposed a framework for development and deployment of IoT applications; more on easy data collection
3	Zhu et al. [11]	2014	proposed a Common Information Model (CIM) standard for information interchange between data sources
4	Abu-Elkheir et al [14]	2013	provided layered stages of data management but the work does not involve any specific handling of realtime processing and performance issues
5	Cecchinell et. al. [15]	2014	handles IoT Big data issues such as Sensor heterogeneity, and even reconfiguration capability
6	Rhodes [16]	2015	Suggested technology tools, protocols and solutions to process data right from devices to the IoT data application softwares
7	Nathan Marz [17]	2014	Lambda Architecture

Existing Approach (Device-to-Cloud)

1/23/2018



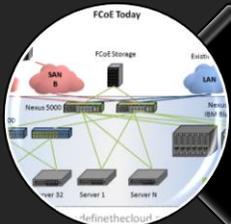
Approach: Fog Computing



The intelli-Fog Cloud Approach



Leveraging mined intelligence from Big data at the Fog layer to make intelligent real time decisions



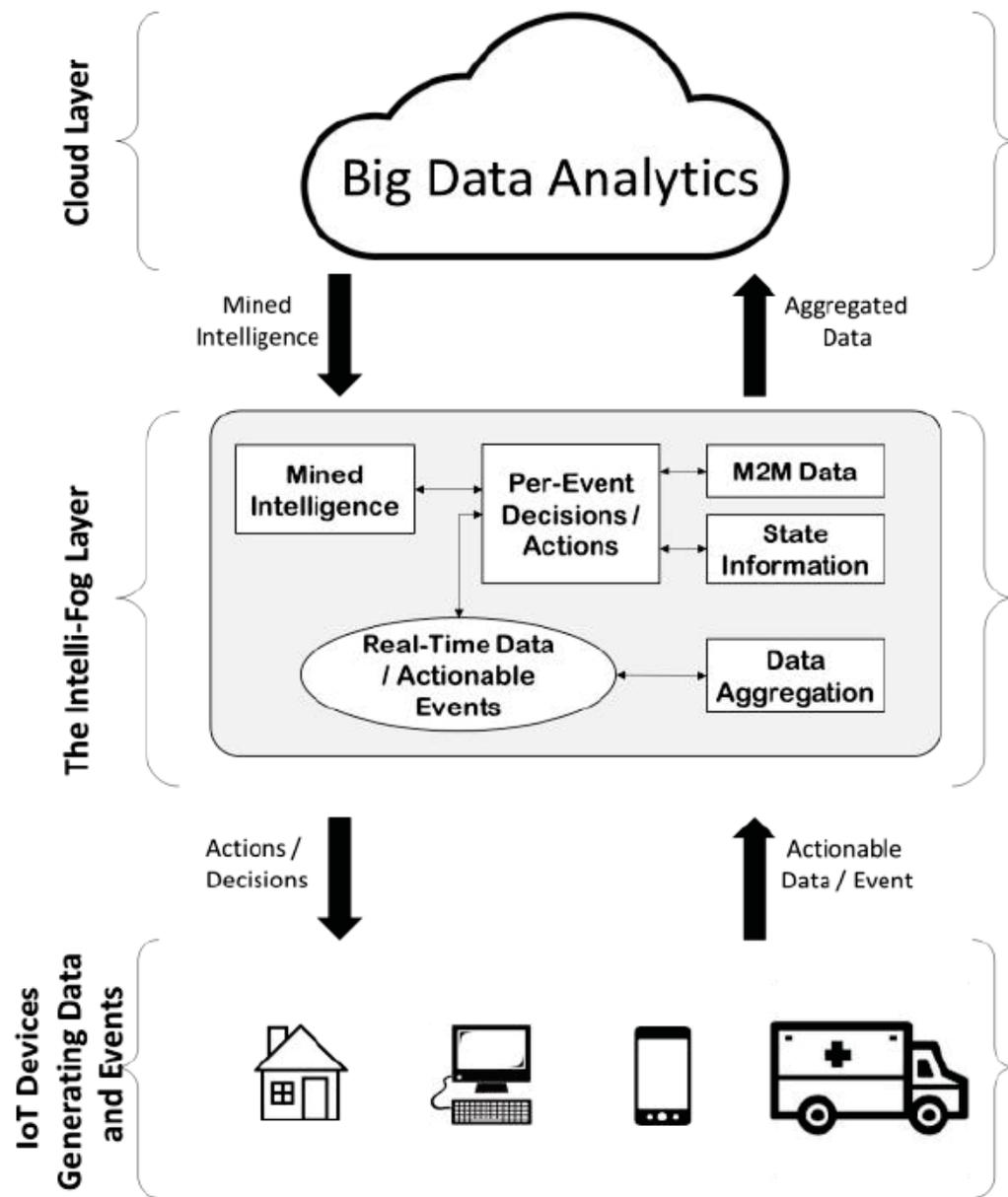
An intelligent Fog increases the capabilities and widens application areas of Fog computing in IoT applications



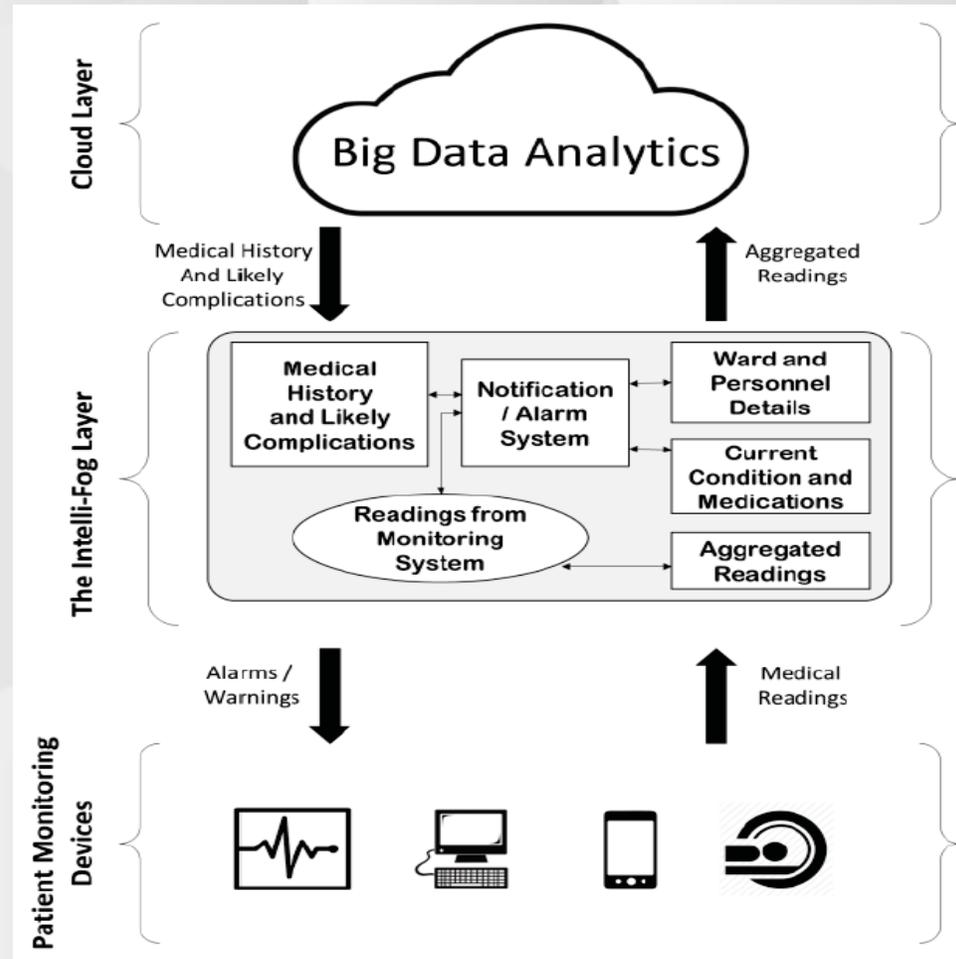
Concurrent device-to-fog and fog-to-cloud back and forth communication



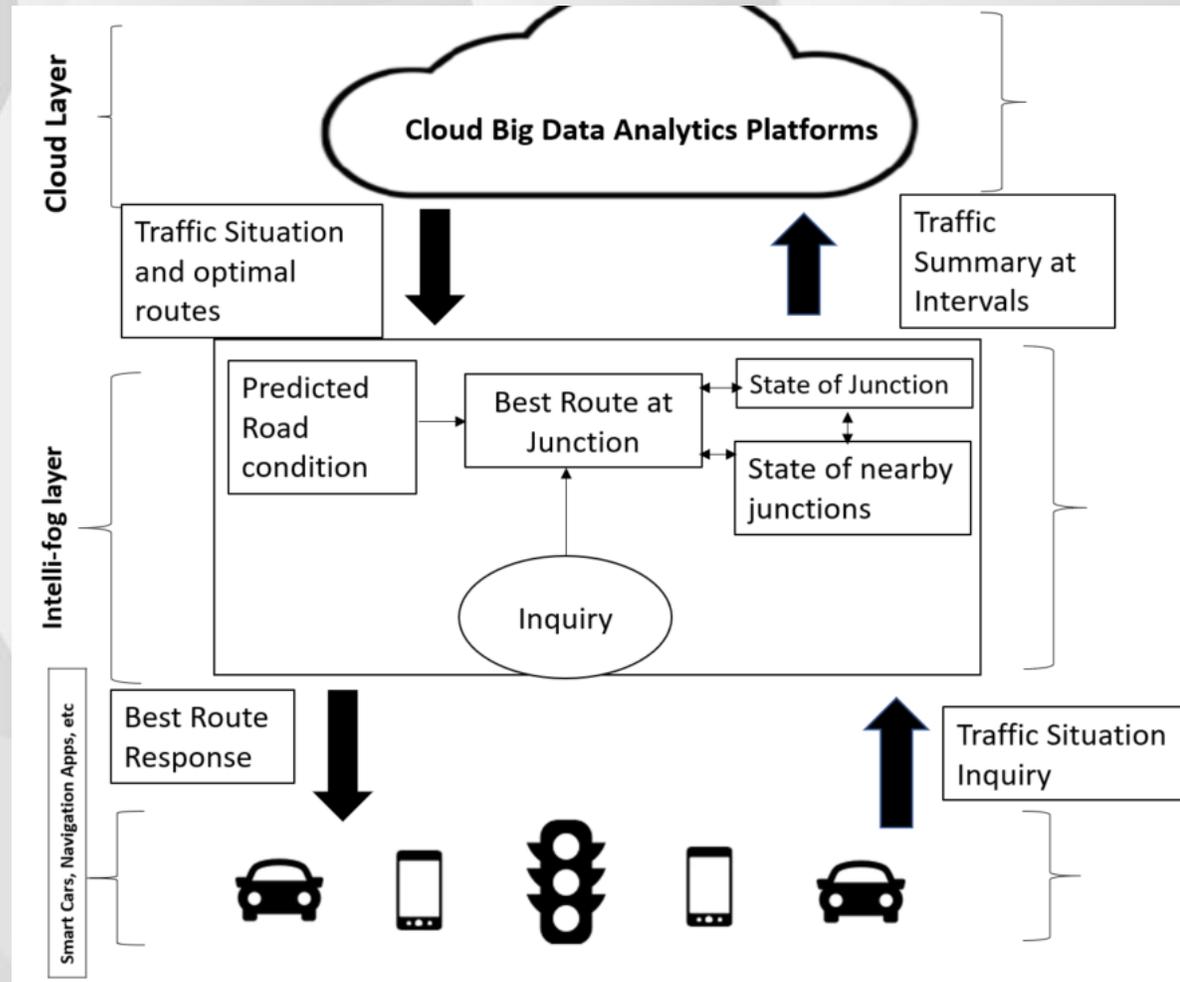
Single data entry point and two way data communication



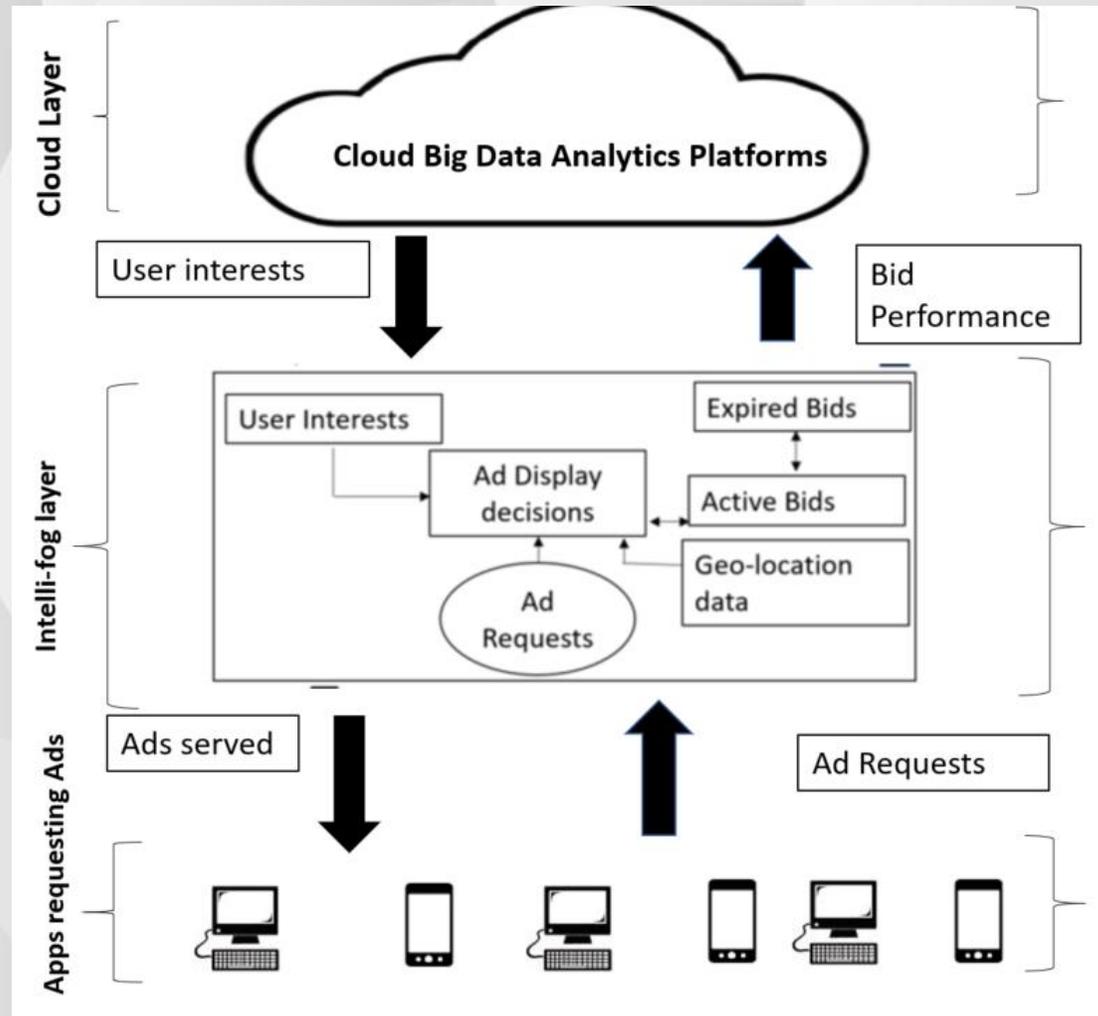
Use Case Scenario 1: Intelligent Patient Monitoring System



Use case Scenario 3: Smart Traffic Light



Use Case Scenario 2: Intelligent Ads Serving System



Conclusion

- Proposed a new approach to IoT data Management
- New approach aims to help IoT application make more intelligent decisions with no significant added latency.
- Illustrated 3 IoT use cases

Recommendations and Future Works

- **Recommendation**
 - Careful Selection of Stream Processing tools for the Cloud Layer
 - Fast communication Infrastructure
- **Future Works**
 - More works on demonstration and testing of this approach
 - Investigation into more efficient IoT data management on the Cloud Layer (Data Ingestion and Analysis)

A red pen is shown writing the words "Thank you" in a black, cursive font on a white surface. The pen is positioned at the end of the word "you", with its tip touching the final letter. The background of the slide features a blue geometric pattern at the top and a light gray geometric pattern on the sides.

Thank you

