Theoretical User Case Two

IOT in the Oil Industry - Proof Chain use

Description

Data is recorded from an offshore oil rig, consisting of “connected” components and sensors, all forming an IOT network. The data generated is high-volume, due to the granular nature of sensor and action data.

Records of automated actions, the reasons why those actions occurred, and the data that drove those reasons to trigger those actions are crucial. E.g. In a case where a sea platform (rig) is being re-positioned dynamically in response to input from sensors which are measuring the behaviour of waves and wind, particular metrics received from the sensors would trigger an action which would affect components.

The Business Intelligence (BI) generated could save large sums of money and lives. Having an immutable record to generate BI from will help to mitigate the risk in using the results to make predictions and proactive management decisions that will have an impact on operating costs and production.

Example

In the case of a large oil spill, the immutable data would provide an action by action account of what led to the spill.

The given organisation absorbs data into an IoT platform and passes data between many diverse devices. Thousands of measurements and other data inputs associated with different IoT nodes are used together to obtain crucial results. In this case the subject organisation is concerned with the re-positioning of an offshore structure (a rig) dynamically in response to input from sensors in the sea measuring behavior of waves and wind. The benefit being that the rig can be proactively re-positioned in response to the incoming adverse wave and wind behavior being monitored. Doing this efficiently reduces down time saving money for the business each year and helps improve safety decisions.

The actual data and the mathematical calculations performed in the re-positioning and safety decisions must be kept for future safety and procedural compliance audits. Additionally this data will be used in the future as a valuable business intelligence resource; possibly assisting other parties to mitigate risks, in making predictions and proactive management decisions. Storing this data on the Evident Proof chain helps to minimize the risk of data corruption and ensures that the company has an accurate data set to work from.

Theoretical User Case Two

IOT in the Oil Industry - Proof Chain use

Potential benefits

Storing IOT data that has an impact on costs and safety decisions in an immutable database and enables the business to:

- Know that future business intelligence extracted from the data will be provably accurate as it is generated from an accurate data set
- Help justify management decisions
- Prove that Service Level Agreements have been met
- Helps Risk Management/reduces risk
- Evidence produced automatically
- Compliance – ISO, UK 'official', Sarbanes-Oxley
- Dispute ready Proof Certificates for events
- Reports / Auditing Service / Proof Certificates / Proof Tokens
- Data cannot be destroyed or hacked.

Type of data

The proof chain will consist of records of automated actions that occurred in an offshore oil rig, received from IOT devices, as a result of triggers that occurred due to a particular set of conditions being true – taking input from sensors. The data stored on the immutable proof chain that drives the business intelligence/management decision making are the results of calculations made on data received from IOT devices - as well as some raw IOT data.

Theoretical volume of data

~ 10 transactions / second

= 600/minute

= 36,000/hour

= 864,000/da

= 26,280,000/month

= 315,360,000 transactions/year.

Theoretical User Case Two

IOT in the Oil Industry - Proof Chain use

Data Schema

ReportedAction Table		
Property	DataType	Description
Id	int (pk)	Unique ID for record
ActionTypeId	int (fk ActionType)	Foreign key – linking to the particular action type that was performed as a result of the trigger
ActionTimestamp	DateTime	The date and time at which the action occurred
ActionResultCode	int	Enumeration – indicating the outcome of the action
ActionResultMessage	string	Message explaining the outcome of the action
ActionTotalElapsedTime	long	Total elapsed time of the action in milliseconds
TriggerTypeId	int (fk TriggerType)	Foreign key – linking to the trigger type that resulted in the action
TriggerTimestamp	DateTime	The date and time at which the trigger was reported
TriggerActionRuleId	int (fk TriggerActionRule)	
AuditText	string	A typed statement of what action occurred, which trigger was reported, and the rule that allowed the action to be triggered by the trigger – including who authorized/created the rule.

ActionType Table		
Property	DataType	Description
Id	int (pk)	Unique ID for the action type
ActionDescription	string	A human readable description of the action
ComponentsAffected	List<Component>	The components that are affected by the action

Theoretical User Case Two

IOT in the Oil Industry - Proof Chain use

Data Schema

Component Table		
Property	DataType	Description
Id	int (pk)	Unique ID for the component
ComponentName	string	The name of the component
PartNumber	string	The part number of the component

TriggerType Table		
Property	DataType	Description
Id	int (pk)	Unique ID for the action type
TriggerDescription	string	A human readable description of the trigger
TriggerConditions	string	The conditions which create the trigger [In some form of query statement, detailing sensors, measurements etc.]

TriggerActionRule Table		
Property	DataType	Description
Id	int (pk)	Unique ID for the action type
TriggerTypeId	int (fk TriggerType)	The trigger type for the rule
ActionTypeId	Int (fk ActionType)	The action type for the rule
AuthorizedBy	string	Employee ID of employee responsible for authorizing the rule creation.