



From sensor data to insight into operations and production

The digital oilfield is awash with modern sensor technologies providing real-time readings of a range of indicators from bottom hole assembly all the way up to the Christmas Tree and beyond. This data can help operators on the rig and in remote operating centres optimise production and improve safety. Key to exploiting this information is the ability to reduce its volume without losing valuable information. Successful implementation requires a planned approach to the processing of raw sensor data in your systems.

Data overload in the Digital Oilfield

Every week, it seems like another sensor technology becomes available, providing real-time readings for an ever-growing range of indicators (e.g. temperature, pressure, vibration, etc). This data can help operators on the rig and in remote operating centres to optimise production. It also provides a valuable source of insight for analysts to understand longer-term production trends and when and how to stimulate the well.

The huge volume of data generated by acoustic and fibre optic sensors means that operators cannot directly interpret readings into real-time, actionable information. Furthermore, moving the ever-increasing volume of data from the rig to the remote operating centre can be challenging in real-time even with current high speed networks.

Overcoming the challenges

The integration of pre-processing / data reduction techniques into the sensor data pipeline provides one solution. This allows the extraction of useful

information at source, thus facilitating the real-time transmission of data to remote control centres. It also enables operators to focus on actionable information rather than a deluge of largely unimportant data. Finally, it also reduces data centre storage requirements.

Tessella has a 30 year track record of providing innovative consultancy and technology solutions to super majors, covering a wide range of upstream and downstream activities. In addition, we have decades of experience dealing with massive data volumes in the nuclear and physics research sectors, coupled with the problems of managing data transfer in the space sector.

It is this unique blend of domain experience and scientific software expertise across multiple industries, which enables Tessella to offer innovative solutions for the digital oilfield.

Getting the approach right

One of the key challenges is to make sure that the reduction approach does not throw away information



that might be of value. Standard data compression algorithms are rarely satisfactory. We recommend the following steps:

- Understand what the core data is and how it is used in the context of engineering decisions.
- Pick the appropriate mathematical and visualization techniques.
- Design and build your data reduction system as a platform that enables new data reduction techniques to be tested, visualized and deployed.

Understand the language of the engineers

Critical success factors include:

- Establishing a good understanding of what the various sensor data is providing information about, in engineering terms.
- Working with the operators to find out how that information is used in context, and what is already known as significant trend information.

It is critical that the IT team are fluent in the underlying engineering language so that they can engage with the operators and understand the context the data is used in to support decision making.

Pick appropriate mathematical and visualisation techniques

Define a core set of data reduction and visualization techniques to apply to the data.

Work with stakeholders to explore what combinations and configurations of these techniques provide insight.

The key to success of this activity is having a firm grasp of a range of mathematical data reduction methods and visualisation techniques, as well as an understanding of how the techniques can be used in the context of the problem.

Use a platform approach

Whatever useful mathematical and reduction techniques you have discovered, they may not cover all your future needs.

The system, therefore, needs to be flexible enough to allow the rapid addition, testing and deployment of new techniques as well as the combination of existing techniques.

Determining the most appropriate architecture, the best technology components and the functionality to be made available to the user will vary from organisation to organisation. Making the correct decisions depends on experience.

Next steps

Tessella is uniquely placed to help clients address this challenge. We have worked with a number of client organisations to develop flexible data reduction frameworks including the Mantid framework.

Mantid is used by two major national physics laboratories to support high-performance computing on neutron and muon experimental data. For more information see:

<http://download.mantidproject.org/videos/DeepZoom/screenshots.html>

Email: info@tessella.com to find out how Tessella can help you.

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