Drilling Lab
A Sensor and Computation Grid Enabled Engineering Model for Drilling Vibration Research

Richard Duff, <rduff@chevron.com> Chevron, Louisiana State University, Society of Petroleum Engineers
Yaakoub El Khamra, <yye000@cct.lsu.edu> Center for Computation and Technology, Louisiana State University, Society of Petroleum Engineers.

Abstract
Across many fields of science and engineering, computer models now play a significant role in scientific discovery through both large scale simulation and real time data acquisition. However, despite steady advances in hardware and software, their application remains frustrated by the limits of their performance. Grid computing is an enabling technology that leverages high performance clusters and supercomputers to support large scale simulations and data intensive applications. The field is rapidly evolving, with new hardware and software being developed at an increasing rate. The goal of this research is to develop a grid enabled drilling system, called DrillingLab, which will allow us to take the next step in drilling simulation, integration, and visualization.

The DrillingLab system includes a custom drilling data acquisition system and a custom sensor report tool. The system monitors and controls the drilling rig, the drill bit, and the down-hole drilling mechanics. It also allows for the integration of real-world data with the simulation. The sensor data is collected by the DrillingLab system and is then interfaced to the DrillingLab database, which contains the simulation data. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Computational Framework

DrillingLab includes a computational framework that is based on the open-source library Cactus. The Cactus framework is used to create a grid enabled drilling simulator. The simulator is used to create realistic drill bit models, which are then integrated into the simulation. This enables us to study the impact of real-world factors on the drilling process. The simulator is also used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Sensor Platform

DrillingLab includes a sensor platform that is used to collect sensor data from the drilling rig. The sensor data is then interfaced to the DrillingLab database, which contains the simulation data. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Relay

DrillingLab includes a relay that is used to control the drilling rig. The relay is used to interface with the DrillingLab database, which contains the simulation data. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Relational Database

DrillingLab includes a relational database that is used to store the simulation data. The database is also used to store the sensor data, which is collected by the sensor platform. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

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Data Acquisition Unit

DrillingLab includes a data acquisition unit that is used to collect sensor data from the drilling rig. The sensor data is then interfaced to the DrillingLab database, which contains the simulation data. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Sensor Measurement to Simulation

DrillingLab includes a sensor measurement to simulation module that is used to interface with the sensor platform. The module is used to collect sensor data from the drilling rig. The sensor data is then interfaced to the DrillingLab database, which contains the simulation data. The data is then stored in a relational database, which is used to create visualizations and to perform analysis. This enables us to integrate real-world data with the simulation, allowing us to study the impact of real-world factors on the drilling process.

Relational Database

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Other

DrillingLab includes other components that are used to support the system. These components include a communication library, a communication module, and a communication server. The communication library is used to facilitate communication between the different components of the system. The communication module is used to interface with the communication server. The communication server is used to facilitate communication between the different components of the system.