Database

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What database?

DBMS: PostgreSQL.

Run on dedicated Database server at RAL

Need to store information on conditions of detector as a function of time

Editing database to be performed by:

- Expert users (Malcolm, David, Paul K. ...)
- EPICS stream
- Data acquisition
- Selected processes

Ideas

Database is required to store:

- Geometry information
- Calibration information
- Cabling
- Environmental measurements
- Detector hardware settings
- Beamline information
- Magnets
- Target
- Absorber
- RF cavities
- ....

Geometry

- Survey information: nominal locations components

- Coordinate Measurement Machine (CMM) measurements

- Alignment constants (eg. Tracker): processes to run on reconstructed tracks to determine residuals. Alignment constants to be stored in DB as function of time (run, stage of MICE, date, etc).

- Positions and orientations of detectors, beamline elements and cooling channel components stored

Calibration

- Calibrations to be provided by:
  - Detectors
  - Devices that produce data in DATE DAQ stream
  - EPICS controls and monitoring
  - Monitoring devices (eg. Beamline monitors)

- Format of calibration will depend on detector or front end electronics board

- Tracker: pedestal, gain, time offset (t0), TDC counts to nanoseconds conversion for each channel.

- Devices that use PMTs: pedestal, gain and t0, TDC counts to time, ADC calibrations

Calibration -2

- TOF detectors: time walk correction to take into account pulse-height versus time (eg. at KEK test beam, time walk was polynomial fit to time versus the square root of ADC)

- CKOV: pedestal and gain (anything else?)

- Calorimeter: amplitude and time (anything else?), depending on choice of front end electronics.

Cabling

- Mapping from electronic channel to physical channel.

- For example, tracker: digitised signal of channel from MCM (Multi Chip Module) on AFEIIt board, reading out half of a VLPC cassette in a VLPC cryostat. Electronic channel connected through waveguides to bundle of 7 fibres in a single view of one station of one trackers.

- Cabling information for all other detectors read out with DATE or EPICS).

- Combination of geometry, cabling and calibration allows reconstruction from binary (DAQ) to physical quantities as function of time (ie. run number, time stamp, ...) since conditions of MICE change.

Other

- Information from slow controls needed for reconstruction or analysis stages.

- Process running in the control room to take info from EPICS stream into database.

- Magnet currents and polarities

- Target information: depth of dip, beam loss info, etc, to calibrate number of muons

- LH2 absorber information (to study cooling as a function of density of hydrogen, for example)

- RF cavity: amplitude/gradient of field and timing for virtual bunch reconstruction as function of RF phase

Server-client interactions

- Application in DAQ to record start of run (run number, date, time, running conditions, etc.) and end of run (including storage)

- Application in control room to read EPICS stream and extract list of parameters as function date/time

- Application takes survey, alignment, etc, information and records it in the database (with valid time period).

- Application takes cabling information and records it in the database (with a valid time period).

- Application takes calibration information and records it in the database (with a valid time period).
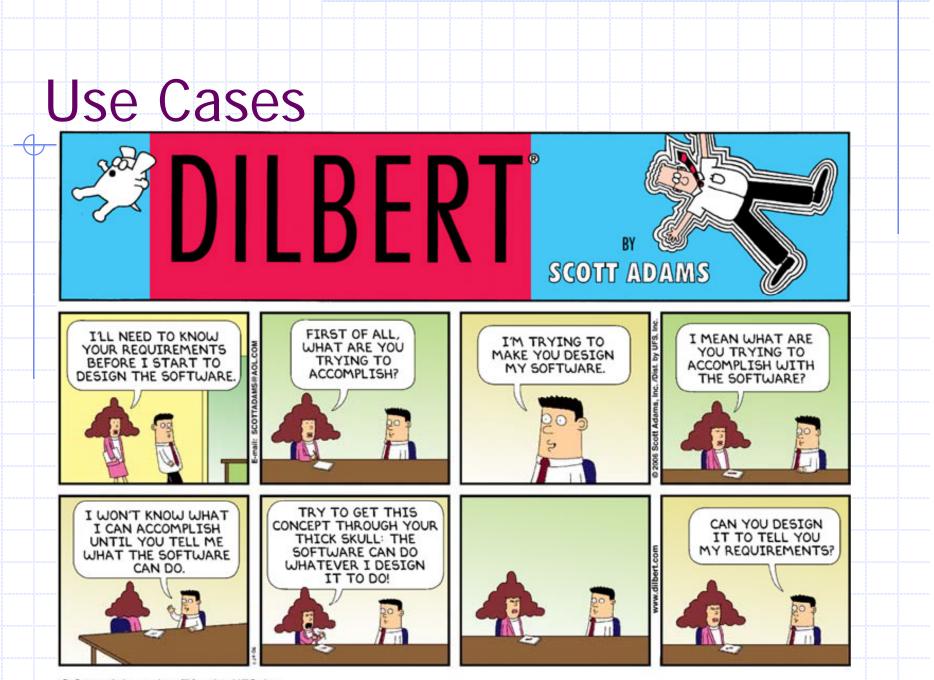
Server-client interactions (2)

- Application queries database to extract geometrical information in order to instantiate G4MICE classes using the known run number or date/time of the event to get the correct information.

- Application queries the database to extract calibration information in order to instantiate relevant G4MICE classes using the known run number or date/time of the event to get the correct information.

- Application queries the database to extract cabling information in order to instantiate relevant G4MICE classes using the known run number or date/time of the event to get the correct information.

Access and Security

- Server running the DB to be located in or near local control room

- G4MICE user account that only has "read" permissions

- MICE DAQ type of account that has "write" permission as it will need to insert into the database (but not delete or modify)

Use Cases

- What do you need/want the database to do for you?

- We need input from <u>all</u> detectors and systems

- Call for use cases was met with silence from everyone except Tracker and Lucien from PID

- We need you to think about what the database needs to provide

- If you don't provide requirements now, we cannot meet those requirements!

Use Cases