Using ArcGIS
for Visualizing Historical Data
from Building Management System

Petr Glos
Masaryk University
Institute of Computer Science
GIS Department
Botanická 68a, 602 00 Brno, Czech Republic
glos@ics.muni.cz

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Agenda

- Introduction – Masaryk University Brno
- Buildings
- Technologies
- BMS
- Historical Data from BMS
- 2D and 3D visualization
- Questions
Masaryk University

- 2nd largest Czech University
- 90 years old
- 9 faculties
- Persons
  - > 35 000 students
  - > 4 500 employees
- Buildings and Rooms
  - > 200 buildings
  - > 17 000 rooms
  - > 335 000 m²
ArcGIS

- Buildings Geodatabase
- BMS Database
- Technologies Geodatabase
- 2D and 3D Visualisation Map, Animation, Video
Technologies
HVAC, Fire alarm system, Access control, Intrusion system,...
Paspart místností a budov
Building Management System

- ORCAview
  - Desktop client
- ORCAweb
  - Web client
- Historian
  - Service for data collection
  - SQL Server
- BACnet
  - Standard for technology network
- Controllers
  - Technology operating
- Devices
- Sensors
Building Management System

- ORCAview
- ORCAweb
- BACnet
- Historian + SQL Server
- Controller
  - Device
  - Sensor
  - ...
Collecting and Archiving Data from BMS

Sensor Device
- Impedance of termistor

Controller
- Value of analog variable

Historian – SQL
- Database record
Trendlog
object for collecting and archiving data from BMS

- **Attributes**
  - Position code,
  - Technology code
  - Time
  - Value

- **Polling - Time Interval**
  - 1 h = 1 value each our is registered

- **Change of Value**
  - 2 °C = next value is registered if temperature changes for 2 °C from previous stored value

- Controllers have buffers for data of trendlogs.
- Historian store data to SQL Server database.
Historical Data from BMS
Visualization

- Position Code - key item for data integration
Visualization

- ArcMap
- ArcScene
- 2D and 3D Thematic Map
  - Values for given instant of time
  - Average, minimum, maximum values ... for time period

- 2D and 3D Animation
  - Values for given time period
  - Video

- Examples
  - Room temperatures
  - Electric energy consumption
2D Thematic Maps
Room Temperatures

Legend

<table>
<thead>
<tr>
<th>Temperature Range</th>
<th>Color</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt; 15.0</td>
<td>Dark Red</td>
</tr>
<tr>
<td>15.1 - 18.0</td>
<td>Red</td>
</tr>
<tr>
<td>18.1 - 20.0</td>
<td>Orange</td>
</tr>
<tr>
<td>20.1 - 22.0</td>
<td>Yellow</td>
</tr>
<tr>
<td>22.1 - 24.0</td>
<td>Light Green</td>
</tr>
<tr>
<td>24.1 - 26.0</td>
<td>Green</td>
</tr>
<tr>
<td>26.1 - 28.0</td>
<td>Light Blue</td>
</tr>
<tr>
<td>28.1 - 30.0</td>
<td>Blue</td>
</tr>
<tr>
<td>30.1 - 32.0</td>
<td>Light Purple</td>
</tr>
<tr>
<td>32.1 - 34.0</td>
<td>Purple</td>
</tr>
<tr>
<td>&gt; 34.0</td>
<td>Dark Purple</td>
</tr>
</tbody>
</table>

Example of temperature distribution:
- 28°C in 1S05
- 22°C in 1S11, 1S12, 1S13, 1S14
- 36°C in 1S18
- 29°C in 1S19
- 27°C in 1S18
2D Thematic Maps
Electric Energy Year Consumption
3D Thematic Maps
Room Temperatures
3D Thematic Maps
Electric Energy Consumption
2D Animation
Computer Room Temperatures

23.8.2008 7:00:17

Legenda

- 11.600000 - 20.000000
- 20.000000 - 20.500000
- 20.500000 - 21.000000
- 21.000000 - 21.500000
- 21.500000 - 22.000000
- 22.000000 - 22.500000
- 22.500000 - 23.000000
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- 33.000000 - 33.500000
- 33.500000 - 34.000000
- 34.000000 - 34.500000
- 34.500000 - 35.000000
- 35.000000 - 35.500000
3D Animation
Room Temperatures

31.12.2008 0:00:01
3D Animation
Electric Energy Consumption

3.8.2008
Questions?

Thank you for your attention.

Petr Glos
Institute of Computer Science
Masaryk University
Botanická 68a, 602 00 Brno
glos@ics.muni.cz
http://www.muni.cz
http://ics.muni.cz
http://maps.muni.cz