EveryBuilding

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Summer 2010 LoCal Retreat
In April 2010, how much energy did this building use?

How much energy did you expect it to use?

If you compared the two numbers, what could you learn?

How much work does it take to make the comparison?
In April 2010, how much energy did this building use?

How much energy did you expect it to use?

If you compared the two numbers, what could you learn?

How much work does it take to make the comparison?
Utility Website – Monthly Data, available everywhere

Smart Meter – Hourly Data with one-day delay, available some places

Networked Submeters + sMAP/IS4 Real-time data and breakdown early adopters and researchers only
In April 2010, how much energy did this building use?

How much energy did you expect it to use?

If you compared the two numbers, what could you learn?

How much work does it take to make the comparison?
In April 2010, how much energy did this building use?

How much energy did you expect it to use?

If you compared the two numbers, what could you learn?

How much work does it take to make the comparison?
In April 2010, how much energy did this building use?

How much energy did you expect it to use?

If you compared the two numbers, what could you learn?

How much work does it take to make the comparison?
Your building runs all the time – day and night.

Why doesn’t your building model run all the time too?
How can we make building models less like Microsoft Office and more like Google Docs?
• Always on
• In the “cloud”
• Many people
• Live updates
• Notified of changes

vs.

• Open and close
• On your computer
• One person
• Send files
• Track changes

How can we make building models less like Microsoft Office and more like Google Docs?
EveryBuilding: trying to make the “virtual building” real

Featured Buildings and Suites

Soda Hall (Building)
Soda Hall, Berkeley, CA 94709, USA

Cory Hall (Building)
Cory Hall: Hearst Avenue @ LeRoy Avenue, Berkeley, CA 94720, USA

RAD Lab (Suite)
4th Floor of Soda Hall
Soda Hall, Berkeley, CA 94709, USA

Fridge (Thing)
Kitchen in RAD Lab on 4th Floor of Soda Hall

Steve’s Apartment (Building)
2235 Ashby Ave, Berkeley, CA 94705, USA

Newest Buildings and Suites

Amy’s Office (Building)
1820 S Grant St, San Mateo, CA 94402, USA
Add a New Building

Name

Address

Description (You can use Textile wiki formatting)

Profile Icon

Photo or Diagram of Building

Google 3D Warehouse Model of Building
(copy the "share" link from the 3D Warehouse page)
David's Home

Building [XML] [IDF]
1314 Hopkins St, Berkeley, CA 94702, USA

Add a Description of this Building

Connections
Connect this Building to Another Space or Thing

Uses Weather Data From
(Weather Station) Weather Underground PWS [edit] [x]
KCABERKE22

Attachments
Add an Attachment

68.6
Thermostat Temperature (F)

Kind
Area
Faceing
Touches

Residence
170.0 m^2
North
Outside

Building added by David C.
March 11, 2010
Cory Hall

Building [XML] [IDF]
Cory Hall: Hearst Avenue @ LeRoy Avenue, Berkeley, CA 94720, USA
Edit this Building

Spaces and Things

Add a New Floor
Add a New Area
Add a New Thing

(Area) Cory Floor3-4 Office
Cooling...
(Floor) 1st Floor...
(Floor) 2nd Floor...
(Floor) 3rd Floor...
(Floor) 4th Floor...
(Floor) 5th Floor
(Floor) Basement...
(Floor) Roof...
(Thing) Cory Switch Block
(Elevator) West passenger elevator
(Transform) Cory Transformer A7 ...

Add a Description of this Building

Connections

Connect this Building to Another Space or Thing

Contains

(Thing) Cory Switch Block

March 18, 2010
Building added by Gilman T.
This XML file does not appear to have any style information associated with it. The document tree is shown below.

```xml
<space>
  <id>45</id>
  <name>Cory Hall</name>
  <type>Building</type>
  <kind/>
  <description/>
  <address>
    Cory Hall: Hearst Avenue @ LeRoy Avenue, Berkeley, CA 94720, USA
  </address>
  <latitude>37.875344</latitude>
  <longitude>-122.257976</longitude>
  <name_chain/>
  <area>10000.0</area>
  <logo>
    http://s3.amazonaws.com/everybuilding/logos/45/original.jpg
  </logo>
  <map>
    http://s3.amazonaws.com/everybuilding/maps/45/original.gif
  </map>
  <gwmodel/>
  <make/>
  <model/>
  <serial/>
  <asset_tag/>
  <outer_space/>
  <inner_spaces>
    <inner_space>
      <name>1st Floor</name>
    </inner_space>
  </inner_spaces>
</space>
```
Cory Switch Block

Distributes 480v 3phase to 13 circuits

Connections
Connect this Thing to Another Space or Thing

Is in
(Building) Cory Hall

33.9
Cory Circuit 02 Power (3PW/BP) (kW)

Cory Circuit 01 Power (lighting) 82.5 kW
Cory Circuit 02 Power (3PW/BP) 33.9 kW
Cory Circuit 03 Power (1 e lab) 4.8 kW
Cory Circuit 04 Power (MCL) 119.3 kW
Cory Circuit 05 Power (4PE) 85.9 kW
Cory Circuit 06 Power (WPR) 20.0 kW
Cory Circuit 07 Power (GPW) 61.5 kW
Cory Circuit 08 Power (5DPC) 10.8 kW
Cory Circuit 09 Power (EPR) 0.0 kW
Cory Circuit 10 Power (5DPA) 89.5 kW
Cory Circuit 11 Power (Pk Str) 40.2 kW
Cory Circuit 12 Power (BG1) 20.1 kW
Cory Circuit 13 Power (BG2) 5.4 kW
Cory Circuit 14 Power (5DPB) 16.3 kW

Add a New Sensor

Thing added by David C. May 16, 2010
Cory Chiller 91

Chiller water serving floors 3 and 4, except the microlab

Connections
Connect this Thing to Another Space or Thing

Attachments
Add an Attachment
This XML file does not appear to have any style information associated with it. The document tree is shown below.

```
<sensor>
  <id>39</id>
  <name>Building-wide Lighting (+ 5th floor power)</name>
  <source_url>
    http://local.cs.berkeley.edu:8005/basement-1/elt-A/data/ABC/sensor/true_power/
  </source_url>
  <description/>
  <space>
    <name>Cory Hall</name>
  </space>
  <created>Fri Apr 16 18:23:16 UTC 2010</created>
  <created_by>
    <user>
      <id>8</id>
      <first_name>David</first_name>
      <last_name>Culer</last_name>
    </user>
  </created_by>
</sensor>
```
EveryBuilding Architectures

sMAP/IS4 Data Servers

Third-Party Apps (e.g. mobile phone)

EveryBuilding Webapp Server (HTML, XML, JSON)

EnergyPlus Model Execution

Database Server (Model Data, Sensor Data)

Weather Underground Poller

Weather Underground Servers

Cloud Architecture

User Interface (Webapp)
Green Building XML
Entity-Relationship Diagram - Excerpt

Campus

Building

Zone

Space

ShellGeometry

Surface

SurfaceSpace Adjacency

Surface (ExteriorWall, InteriorWall, RaisedFloor, Air, SlabOnGrade)

Opening

Opening (NonSlidingDoor, FixedWindow,

ClosedShell

AnalyticalShell

ShellSurface (Ceiling, Floor, Wall, Air)

ShellOpening (Door, Window)
EveryBuilding
Entity-Relationship Diagram

- User
- Space
  - space graph
  - created-by – also applies to attachment and sensor
- SpaceRelationship
- Checkin
- Attachment
- Sensor
  - sensor connection
- Subscription
- SensorReading

Note: A “space” can also be a “thing”.
IDF file created by EveryBuilding at 2010-05-05 00:16:28 -0700

Version, 4.0;

Timestep, 4;

GlobalGeometryRules, UpperLeftCorner, CounterClockwise, WorldCoordinateSystem;

RunPeriod, Trailing Week, 4, 28, 5, 4;

Building, David's Home;

Zone, David's Home;

Floor:Adiabatic, David's Home:Floor, Slab, David's Home, 0, 180, 0, 0, 0, 13.0384048104053, 13.0384048104053;

Roof, David's Home:Roof, Roof, David's Home, 0, 0, 0, 0, 10, 13.0384048104053, 13.0384048104053;

Wall:Exterior, David's Home:WallN, Wall, David's Home, 0, 90, 0, 0, 0, 13.0384048104053, 10;

Wall:Exterior, David's Home:WallE, Wall, David's Home, 90, 90, 13.0384048104053, 0, 0, 13.0384048104053, 10;

Wall:Exterior, David's Home:WallS, Wall, David's Home, 180, 90, 13.0384048104053, -13.0384048104053, 0, 13.0384048104053, 10;

Wall:Exterior, David's Home:WallW, Wall, David's Home, 270, 90, 0, -13.0384048104053, 0, 13.0384048104053, 10;

ScheduleTypeLimits, Any Number;

Schedule:Compact, All Day Occupancy, Any Number, Through: 12/31, For: AllDays, Until: 24:00, 1.0;

Schedule:Compact, General Activity, Any Number, Through: 12/31, For: AllDays, Until: 24:00, 131.8;

Construction, Slab, 4-inch Concrete;

Construction, Ceiling, R-13 No Mass;

Construction, Wall, R-13 No Mass;

Construction, Roof, R-31 No Mass;

Material, 4-inch Concrete, MediumRough, 0.1016, 1.729577, 2242.585, 836.8, 0.9, 0.65, 0.65;

Material:NoMass, R-6 No Mass, Rough, 1.1455, 0.9, 0.7, 0.7;

Material:NoMass, R-13 No Mass, Rough, 2.290965, 0.9, 0.7, 0.7;

Material:NoMass, R-31 No Mass, Rough, 5.456, 0.9, 0.75, 0.75;
EveryBuilding Entity-Relationship Diagram

User

Space

SpaceRelationship

Sensor

Subscription

SensorReading

Checkin

Attachment

Note: A “space” can also be a “thing”.

created-by – also applies to attachment and sensor

space graph

sensor connection
Temperature (C)

Sensor [XML] in (Weather Station) Weather Underground PWS KCABERKE22

Edit this Sensor

Hour Trend

Day Trend

Week Trend

Add a Reading: C

Upload Reading CSV

Readings [XML] [CSV]
2010-05-04 23:48:17 11.9 C
2010-05-04 23:43:24 11.8 C
2010-05-04 23:38:27 12.1 C
2010-05-04 23:33:09 12.0 C
2010-05-04 23:28:14 11.9 C
2010-05-04 23:23:16 11.8 C
2010-05-04 23:18:20 12.2 C
2010-05-04 23:13:27 12.5 C
2010-05-04 23:08:08 12.4 C
2010-05-04 23:03:11 12.2 C
2010-05-04 22:58:14 12.2 C
2010-05-04 22:53:17 12.5 C
2010-05-04 22:48:21 12.6 C
2010-05-04 22:43:08 12.6 C
2010-05-04 22:38:11 12.7 C
2010-05-04 22:33:13 12.6 C
2010-05-04 22:28:16 12.8 C
2010-05-04 22:23:18 12.8 C
2010-05-04 22:18:21 12.9 C

Only showing the last 20 readings.
Add a New Sensor

Name

Units
(e.g. "kW")

Show a box for this sensor at the top of the space's page?

Only show the sensor's last reading if it was received less than an hour ago?

Live Sensor Data Source
Subscription Protocol

Data Publisher URL

Data Source URL

Description (You can use [Textile wiki formatting](https://www.textile.com/))
Thermostat Temperature (F)

Sensor [XML] in (Building) David's Home
1314 Hopkins St, Berkeley, CA 94702, USA

Edit this Sensor

Hour Trend

Day Trend

Week Trend

Readings [XML] [CSV]

2010-05-04 23:45:00    68.573 F
2010-05-04 23:30:00    68.71 F
2010-05-04 23:15:00    68.887 F
2010-05-04 23:00:00    69.033 F
2010-05-04 22:45:00    69.107 F
2010-05-04 22:30:00    69.35 F
2010-05-04 22:15:00    69.403 F
2010-05-04 22:00:00    69.593 F
2010-05-04 21:45:00    69.703 F
2010-05-04 21:30:00    69.65 F
2010-05-04 21:15:00    69.843 F
2010-05-04 21:00:00    70.07 F
2010-05-04 20:45:00    70.313 F
2010-05-04 20:30:00    70.543 F
2010-05-04 20:15:00    70.817 F
2010-05-04 20:00:00    71.013 F
2010-05-04 19:45:00    71.163 F
2010-05-04 19:30:00    71.353 F
2010-05-04 19:15:00    71.568 F
2010-05-04 19:00:00    71.567 F
everybuilding.gtolle.com

Gilman Tolle

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