



# Rendering/Visualizing Data from Multiple Entities

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# Outline

- ▶ Issues discussion
- ▶ Technologies now available
  - plain XBRL, XBRL processors, XSLT, iXBRL
- ▶ Examples of multi-entity rendering
  - XSLT processor-assisted rendering
  - Web service multi-entity compositional rendering
- ▶ What is coming up
  - Multi-entity use of Formula, Versioning spec
  - Multi-entity mapped relational databases

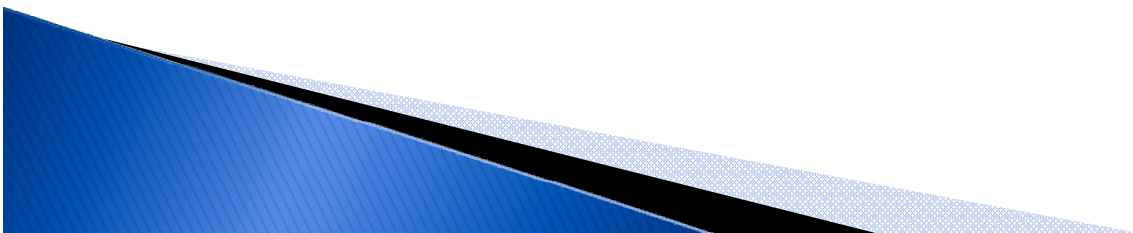
# Aspects of topic by renderer

(Rendering/Visualizing Data from Multiple Entities)

- ▶ By *producer* of data at a single source
  - Constraints in preparing data
- ▶ By *aggregator* of, or *authority* collecting data
  - SEC – every submitter own extension, own linkbases
  - FDIC – every submitter exactly same stuff
  - EDInet – submitter extensions but linkbases only tweaked, not replaced
- ▶ By *consumer/integrator*
  - Individual investor - fund/stock reports

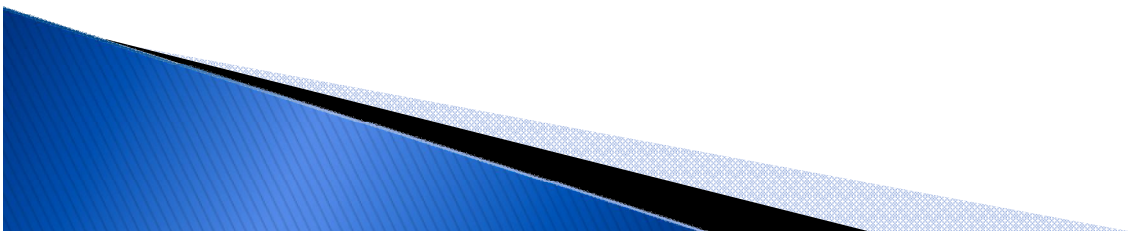
# Impact of multiple entities

- ▶ Instance document submissions
  - Multiple entities in one instance, one DTS
  - Separate instances, share same DTS
  - Separate instances, each own separate DTS
- ▶ Examples of multi-entity solutions
  - Simple rendering with ordinary XML tools
  - Web based multi-entity compositional rendering



# What does rendering mean

- ▶ Show entity reports in different tabs/windows
- ▶ Align multiple entities to adjacent columns
- ▶ Align data of different periods
- ▶ Grab data from source prepared for merging
- ▶ Grab data on the fly from original sources



# Producer issues (technological)

- ▶ XBRL
  - Model concepts
  - Presentation semantics
  - Definition/dimensional semantics (if not us-gaap)
  - Display formatting (inline-XBRL or XSLT)
- ▶ Web (+ Excel, Word docs)
  - Tabular rendered data may have clear semantics
  - Inferring semantics from formatting
- ▶ Relational database
  - Is data provided with schema & stored procedures, or just extractable post-rendering

# XBRL vs Non-XBRL

- ▶ XBRL centric approach:
  - Map non-XBRL data into XBRL
  - Multi-entity rendering from XBRL model
  - XBRL has robust semantics and validation
- ▶ Database centric approach
  - Map XBRL into database table model
  - Render from table model
  - SQL has robust data joining mechanism
- ▶ Other
  - Excel centric views



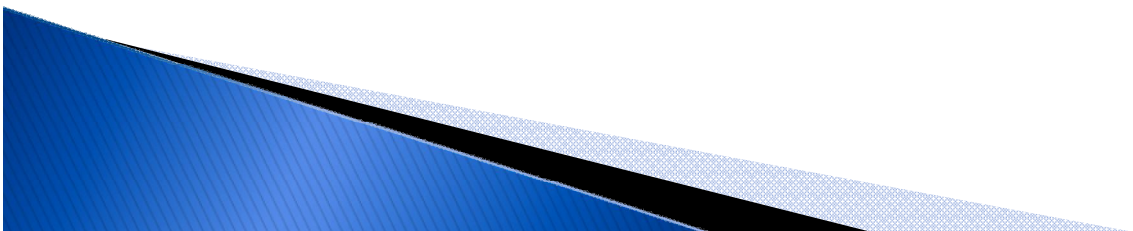
# Aggregator authority issues

- ▶ Submission integrity and contents
  - Name, tag, and label integrability
  - Semantic structure integrability
- ▶ Technology supportive of integration
  - XBRL
    - in XBRL native form
    - reduced into SQL or other neutral form
  - Non-XBRL data
    - promoted into XBRL
    - integrated in SQL
    - other



# Consumer integrators

- ▶ Kind of consumer
  - Institutional or business entity with sophistication
  - Individuals with purpose and repetitive tasks (e.g. private investor)
  - Casual web surfer



# Consumer integrator issues

- ▶ Multi-entity rendering integration
  - Tabular vs. entity-by-entity non-tabulated
  - Elision, reduction, and finding items
  - As-submitted (e.g., known-good XBRL) vs. as extracted (by software with humans)
  - Nomenclature reduction (unique names mapping for multi-entity tabulation)

# Model concepts

- ▶ Submitter constrained
  - France: only one chart of accounts
- ▶ Submitter freedom
  - Prudential reporting in Europe
    - Pan-Europe with country and bank extensions
  - SEC
    - US-GAAP taxonomies are extended by submitter
    - Namespace and standard concepts different per year
  - Japan
    - EDInet is extended by submitter
    - Entity concept model changes each period

# Model concepts multi-period merging

- ▶ Namespaces and names may need mapping
  - Versioning spec has mapping mechanism
  - XBRL Formula for semantic composition
  - Java etc for API based implementation

# Presentational semantics

- ▶ Submitter extends core taxonomy linkbase
  - Europe prudential taxonomies (FINREP, COREP)
  - Japan EDInet
- ▶ Submitter crafts own linkbase
  - SEC submittals
  - Extended tables of dimensions and line items
- ▶ Presentation coupling with dimensions
  - US-GAAP tightly coupled
  - Others (informally) decoupled

# Model concepts multi-entity merging

- ▶ Core concepts dependable in France, Europe
- ▶ SEC submitter designs own presentation & dimension semantics
- ▶ EDInet submitter uses core presentation semantics

# Rendering and visualizing issues

- ▶ Is it pre-rendered with iXBRL
- ▶ Is it on-line
- ▶ Is it dynamically generated
- ▶ Has merge mechanism been pre-prepared
- ▶ Is an XBRL processor available



# iXBRL rendering

- ▶ HTML or XHTML embeds one XBRL instance
  - Producer's source rendering
  - Instance extractable from HTML/XHTML
- ▶ Multiple entities rendering could mean
  - All entities in one instance, share one DTS
    - Multiple entities joined and rendered by producer
  - Separate iXBRL per entity, share DTS
    - Up to aggregator or consumer to join and render
  - Separate iXBRL per entity, own separate DTS
    - Ditto

# iXBRL renders as HTML

```
<?xml version="1.0" encoding="UTF-8"?>
<head> ...
<link rel="stylesheet" type="text/css" href="iascf-style.css"/>
<title>IASCF 2007 ANNUAL REPORT</title>
</head> ...
<body class="body">
<table align="center" width="800px" border="0" cellpadding="0"
  cellspacing="0">
<tr>
<td>
<p align="center" class="header">2007 ANNUAL REPORT</p>
<p align="center">
<a href="#statement1" class="nounderline">Statement of
  comprehensive income</a>
</p>
```

# iXBRL of a fact value

```
<td class="tableLightGrey" colspan="2" valign="top">
<p title="iascf:Contributions id:
  id_footnote_elem_11688477 decimals: 0 ix:contextRef:
  FY07d ix:unitRef: GBP" style="text-align: right;color:
  black">
<ix:nonFraction
  xmlns:ns0="http://www.xbrl.org/2008/inlineXBRL"
  id="id_footnote_elem_11688477" decimals="0"
  ix:contextRef="FY07d" ix:unitRef="GBP"
  ns0:format="commadot" ns0:name="iascf:Contributions"
  ns0:scale="3">11,277</ix:nonFraction>
</p>
</td>
```

# iXBRL references, resources

```
<div style="display: none">
<ix:header>
<ix:references>
<link:schemaRef ... xlink:href="iascf_2008-02-28.xsd"/>
</ix:references>
<ix:resources>
<xbrli:context id="FY07d">
<xbrli:entity>
<xbrli:identifier
  scheme="http://www.iasb.org/AnnualReport/">IASCF</xbrli:ide
  ntifier>
</xbrli:entity>
<xbrli:period>
<xbrli:startDate>2007-01-01</xbrli:startDate>
<xbrli:endDate>2007-12-31</xbrli:endDate>
  </xbrli:period>
```

# XBRL Rendering Linkbase

- ▶ Formal definition of rendering in XBRL
  - Depends on single DTS
  - Static definition of formatting
  - Dimensional rendering based on DTS

# XSLT for XBRL

- ▶ XSLT is ubiquitous
- ▶ XBRL is XML
- ▶ XSLT utilizes XBRL processor functions

# XSLT example, multi-entity XBRL

- ▶ Style sheet using XBRL processor functions
  - Vendor-provided functions (legacy)
  - Functions-registry provided functions (Formula WG)
- ▶ Dynamic rendering can be DTS independent
- ▶ Usually single-instance per rendering
  - Example here is multiple entity instance



# Multi entity compilation by XSLT

- ▶ Dynamic composition based on
  - Entity model in dimensions axis
  - Share classes in dimension axis
  - Line items in presentation LB of table
- ▶ Example for XBRL-US RR instances
  - Each submission custom-extends taxonomy
  - Submission-provided presentation linkbase
    - Of dimensions (entities)
    - Of line items

# Example of XSLT-based rendering

- ▶ Vertical axis represents line items tree
  - Dynamic rendering of instance DTS
- ▶ Horizontal represents dimensions axes
  - Hierarchy of multiple entities
  - Hierarchy of share classes

# Single entity

Presentation View

- Extended Link (994300 - Document - Form N-1A)
  - Form N-1A [Abstract]
    - Registration Statement Filing Date
    - Registration Statement Effective Date
    - Prospectus Date
    - Prospectus [Table]
      - Series and Index [Axis]
        - Series and Index [Domain]
          - AIM Tax-Exempt Cash Fund
      - Prospectus Share Class [Axis]
        - Share Class [Domain]
          - Class A
          - Investor Class
      - Prospectus [Line Items]
        - Trading Symbol
        - Risk Return [Abstract]
          - Objective Section [Abstract]
            - Expenses [Abstract]
              - Shareholder Fees [Abstract]
                - Operating Expenses [Abstract]
                  - Expense Footnotes [Abstract]
                    - Expense Example Narrative [Abstract]
                      - Expense Example [Abstract]

## DTS dimension axes members tree

|                                | Series and Index [Domain] |                |                                                                                                                                                                                                                                                                             |
|--------------------------------|---------------------------|----------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                | AIM Tax-Exempt Cash Fund  |                |                                                                                                                                                                                                                                                                             |
|                                | Share Class [Domain]      |                |                                                                                                                                                                                                                                                                             |
|                                | Class A                   | Investor Class |                                                                                                                                                                                                                                                                             |
| Prospectus [Line Items]        |                           |                |                                                                                                                                                                                                                                                                             |
| Risk Return [Abstract]         |                           |                |                                                                                                                                                                                                                                                                             |
| Risk Return [Heading]          |                           |                | Risk/Return Summary                                                                                                                                                                                                                                                         |
| Objective Section [Abstract]   |                           |                |                                                                                                                                                                                                                                                                             |
| Objective Primary [Text Block] |                           |                | The fund's investment objective is to provide as high a level of tax-exempt income as is consistent with the preservation of capital and maintenance of liquidity.<br>The fund's investment objective may be changed by the Board of Trustees without shareholder approval. |
| Expenses [Abstract]            |                           |                |                                                                                                                                                                                                                                                                             |
| Expense [Heading]              |                           |                | Fee Table and Expense Example                                                                                                                                                                                                                                               |
| Expense Narrative [Text Block] |                           |                | If a financial institution is managing your account, you may also be charged a transaction or other fee by such financial institution.<br>As a result of 12b-1 fees, long-term shareholders in the fund may pay more than the maximum permitted initial sales charge.       |
| Shareholder Fees [Abstract]    |                           |                |                                                                                                                                                                                                                                                                             |
| Shareholder Fees Caption       |                           |                | Shareholder Fees<br>(fees paid directly from your investment)                                                                                                                                                                                                               |

## DTS presentation of line items

# Multiple entity (same stylesheet)

DTS dimensions, entity & share axes members trees

The screenshot displays a DTS tool interface. On the left is a tree view showing the hierarchy of data sources: Prospectus [Table], Series and Index [Axis], EuroPacific Growth Fund, MSCI All Country [Member], Lipper [Member], MSCI EAFE [Member], Prospectus Share Class [Axis], Share Class [Domain], and All Instruments (Class A, Class R-1, Class R-2, Class R-3, Class R-4, Class R-5, Class B, Class C, Class F). On the right is a data table with columns for 'Class A' through 'Class F', 'group C000026337', and 'group C000026336'. The table contains rows for 'Risk/Return summary', 'Fees and expenses of the fund', and 'SHAREHOLDER FEES (PAID DIRECTLY FROM YOUR INVESTMENT)'. Arrows indicate the mapping from the tree view to the table data.

|                                                                           | Class A | Class B | Class C | Class F | Class 529-A | Class 529-B | Class 529-C | Class 529-E | Class 529-F | group C000026337 | group C000026336 | MSCI All Country [Member] | Lipper [Member] | MSCI EAFE [Member] |
|---------------------------------------------------------------------------|---------|---------|---------|---------|-------------|-------------|-------------|-------------|-------------|------------------|------------------|---------------------------|-----------------|--------------------|
| Risk/Return summary                                                       |         |         |         |         |             |             |             |             |             |                  |                  |                           |                 |                    |
| Fees and expenses of the fund                                             |         |         |         |         |             |             |             |             |             |                  |                  |                           |                 |                    |
| SHAREHOLDER FEES (PAID DIRECTLY FROM YOUR INVESTMENT)                     |         |         |         |         |             |             |             |             |             | 2                | 3                |                           |                 |                    |
| Maximum Sales Charge Imposed on Purchases over Offering Price             | 5.75%   |         |         |         |             |             |             |             |             |                  |                  |                           |                 |                    |
| Maximum Deferred Sales Charge over Offering Price                         |         | 0%      | 0%      | 0%      |             |             |             | 0%          |             |                  |                  |                           |                 |                    |
| Maximum Deferred Sales Charge over Other                                  | 0%      | 5%      | 1%      | 0%      |             |             |             | 0%          |             |                  |                  |                           |                 |                    |
| Maximum Sales Charge on Reinvested Dividends and Distributions over Other | 0%      | 0%      | 0%      | 0%      |             |             |             | 0%          |             |                  |                  |                           |                 |                    |

(sparse data rows/columns are elided)

# XSLT model, view, rendering

- ▶ Two XSLT phases
  - Model and view extraction phase
    - Extract line items and dimension axes to xml
    - Extract instance data to xml
  - Rendering phase
    - Develop column headers
    - Develop row headers
    - Identify sparse rows/columns
    - Render populated rows/columns
- ▶ First phase uses XBRL processor functions
- ▶ Second phase uses XSLT keys and functions



# Web service example

- ▶ Company tax report filings
  - Separate filing per period per company
  - Instance document converted into XBRL
  - Taxonomy matches company report structure
  - Single period data
- ▶ Viewers want
  - Side-by-side merged rendering of
    - Multiple periods
    - Multiple companies

# XBRL–Gateway project (Japan)

- ▶ Goal to convert public filings into XBRL
  - Initially used Yuho (entity-based) taxonomy
  - Transitioning to EDInet
- ▶ Build multi-entity multi-period viewer
  - Subscriber based web service
  - Select up to 10 entities, multiple periods, merged view



# Choosing items, periods & entities

The screenshot shows the XBRL Viewer application running in Internet Explorer. The browser address bar shows the URL: `http://localhost/XV/XbrlViewer.aspx?action=loadInstance&separateCrDbRaCols=true`. The application interface includes a menu bar (File, Edit, View, Favorites, Tools, Help) and a toolbar with icons for CSV saving, printing, displaying, and graphing. The main content area displays a message: "表示させるための条件を選択して下さい。" (Please select conditions for display).

The left sidebar contains the following sections:

- 使用方法** (Usage Method)
- 表示項目の選択** (Selection of Display Items):
  - 有価証券報告書 (Securities Report)
  - 【表紙】 (Cover)
  - 第一部 【企業情報】 (Part 1: Company Information)
  - 第二部 【提出会社の保証会】 (Part 2: Guarantors of the Reporting Company)
- 会計年度** (Fiscal Year):
  - 2007
  - 2006
  - 2005
- 企業名** (Company Name):
  - eE00051 前 (Previous)
  - eE00052 大 (Large)
  - eE00053 清 (Clear)

The status bar at the bottom indicates "Done", "Local intranet", and "100%".

# User workflow

- ▶ A prior search engine screen narrowed down choice of reporting entities, choosing up to 10 to load to XBRL viewer

| 表示項目の選択                                |                          |
|----------------------------------------|--------------------------|
| <input type="checkbox"/> 有価証券報告書       | <input type="checkbox"/> |
| <input type="checkbox"/> 【表紙】          | <input type="checkbox"/> |
| <input type="checkbox"/> 第一部【企業情報】     | <input type="checkbox"/> |
| <input type="checkbox"/> 第二部【提出会社の保証会】 | <input type="checkbox"/> |

| 会計年度                          | 企業名                                |
|-------------------------------|------------------------------------|
| <input type="checkbox"/> 2007 | eE00051 前 <input type="checkbox"/> |
| <input type="checkbox"/> 2006 | eE00052 大 <input type="checkbox"/> |
| <input type="checkbox"/> 2005 | eE00053 清 <input type="checkbox"/> |

After choice is narrowed down, loaded to viewer, then user selects entities in viewer

# Selecting periods and items

- ▶ A prior search screen allowed narrowing down choice of reporting entities, choosing up to 10 to load to XBRL viewer

The screenshot shows a web interface for NIT Beta. At the top left is the logo 'NIT Beta' and the text '使用方法' (Usage Method). Below it is a section titled '表示項目の選択' (Selection of display items). This section contains a list of items with checkboxes:

| Item            | Checkbox                 |
|-----------------|--------------------------|
| 有価証券報告書         | <input type="checkbox"/> |
| + 【表紙】          | <input type="checkbox"/> |
| + 第一部 【企業情報】    | <input type="checkbox"/> |
| + 第二部 【提出会社の保証会 | <input type="checkbox"/> |

Below this is a section for selecting reporting periods and companies. It has two columns: '会計年度' (Fiscal Year) and '企業名' (Company Name). The '会計年度' column has three rows with checkboxes:

| Fiscal Year | Checkbox                 |
|-------------|--------------------------|
| + 2007      | <input type="checkbox"/> |
| + 2006      | <input type="checkbox"/> |
| + 2005      | <input type="checkbox"/> |

The '企業名' column has three rows with checkboxes:

| Company Name | Checkbox                 |
|--------------|--------------------------|
| eE00051 前    | <input type="checkbox"/> |
| eE00052 大    | <input type="checkbox"/> |
| eE00053 清    | <input type="checkbox"/> |

Two purple circles highlight the '表示項目の選択' section and the '会計年度' section. A purple arrow points from the text 'Selection of subtrees of merged concepts to view (Yuho taxonomy) and extended link role (EDInet).' to the first circle. Another purple arrow points from the text 'Selection of reporting period(s)' to the second circle.

Selection of subtrees of *merged* concepts to view (Yuho taxonomy) and extended link role (EDInet).

Selection of reporting period(s)

# Selecting 1 entity 2 yrs

The screenshot shows the Xbrl Viewer interface. On the left, a sidebar contains a tree view of concepts. Two red circles highlight the 'Account Year' (会計年度) and 'Entity Name' (企業名) columns. The main grid displays financial data for 2006 and 2007, with columns for 'Amount 1' (金額1), 'Amount 2' (金額2), and 'Others' (その他). The entity selected is 'eE00051 前田建設工業株式会社'.

|          | 2006 |             |       | 2007 |             |       |
|----------|------|-------------|-------|------|-------------|-------|
|          | 金額1  | 金額2         | その他   | 金額1  | 金額2         | その他   |
| 株主資本     |      |             |       |      |             |       |
| 資本金      | —    | JPY 23,454  | 4.20  | —    | JPY 23,454  | 5.20  |
| 資本剰余金    | —    | JPY 31,709  | 5.70  | —    | JPY 31,709  | 7.00  |
| 利益剰余金    | —    | JPY 104,235 | 18.90 | —    | JPY 57,190  | 12.60 |
| 自己株式     | —    | △JPY 2,491  | △0.50 | —    | △JPY 2,511  | △0.60 |
| 株主資本合計   | —    | JPY 156,908 | 28.40 | —    | JPY 109,842 | 24.20 |
| 評価・換算差額等 | —    | —           | —     | —    | —           | —     |
| その他有価証券  | —    | JPY 33,758  | 6.10  | —    | JPY 19,507  | 4.30  |
| 為替換算調整勘  | —    | △JPY 31     | —     | —    | △JPY 77     | —     |
| 評価・換算差額  | —    | JPY 33,727  | 6.10  | —    | JPY 19,429  | 4.30  |

entity items in merged-concepts tree grid

# Japan has 3-columns per context

The screenshot shows the Xbrl Viewer interface. The main table displays data for two contexts: 2006 and 2007. The columns are labeled '金額1', '金額2', and 'その他'. A pink oval highlights these three columns, with arrows pointing to labels 'credit value', 'debit value', and 'explanatory note or text value'.

|           | 2006 |     |     | 2007 |     |     |
|-----------|------|-----|-----|------|-----|-----|
| 概念        | 金額1  | 金額2 | その他 | 金額1  | 金額2 | その他 |
| 有価証券報告書   |      |     |     |      |     |     |
| 第一部【企業情報】 |      |     |     |      |     |     |
| 第5【経理の状況】 |      |     |     |      |     |     |
| 【連結財務諸表等】 |      |     |     |      |     |     |
| 【連結財務諸表】  |      |     |     |      |     |     |
| 【連結貸借対照表】 |      |     |     |      |     |     |
| 連結貸借対照表   |      |     |     |      |     |     |
| 純資産の部     |      |     |     |      |     |     |

credit value

debit value

explanatory note  
or text value



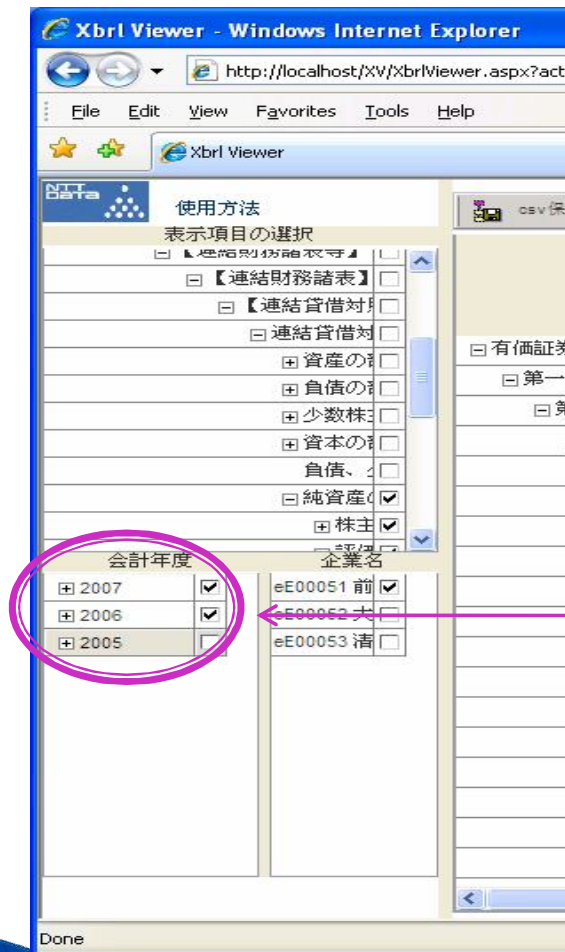
# 3 entities 2 yrs

The screenshot shows the Xbrl Viewer interface with the following components:

- Left Sidebar:**
  - Accounting Year (会計年度): 2007, 2006, 2005
  - Company Name (企業名): eE00051 前田建設工業株式会社, eE00052 大成建設株式会社, eE00053 清水建設株式会社
- Main Table:**

| Concept    | eE00051 前田建設工業株式会社 |             |     | eE00052 大成建設株式会社 |             |       | eE00053 清水建設株式会社 |             |       |
|------------|--------------------|-------------|-----|------------------|-------------|-------|------------------|-------------|-------|
|            | 金額1                | 金額2         | その他 | 金額1              | 金額2         | その他   | 金額1              | 金額2         | その他   |
| 有価証券報告書    |                    |             |     |                  |             |       |                  |             |       |
| 第一部 【企業情報】 |                    |             |     |                  |             |       |                  |             |       |
| 第5 【経理の状況】 |                    |             |     |                  |             |       |                  |             |       |
| 【連結財務諸表等】  |                    |             |     |                  |             |       |                  |             |       |
| 【連結財務諸表】   |                    |             |     |                  |             |       |                  |             |       |
| 【連結貸借対照表】  |                    |             |     |                  |             |       |                  |             |       |
| 連結貸借対照表    |                    |             |     |                  |             |       |                  |             |       |
| 純資産の部      |                    |             |     |                  |             |       |                  |             |       |
| 株主資本       |                    |             |     |                  |             |       |                  |             |       |
| 資本金        |                    | JPY 23,454  |     |                  | JPY 112,448 | 5.60  |                  | JPY 74,365  | 4.00  |
| 資本剰余金      |                    | JPY 31,709  |     |                  | JPY 79,475  | 4.00  |                  | JPY 43,185  | 2.30  |
| 利益剰余金      |                    | JPY 104,235 |     |                  | JPY 74,892  | 3.80  |                  | JPY 118,790 | 6.40  |
| 自己株式       |                    | △JPY 2,491  |     |                  | △JPY 179    |       |                  | △JPY 1,090  |       |
| 株主資本合計     |                    | JPY 156,908 |     |                  | JPY 266,636 | 13.40 |                  | JPY 235,250 | 12.70 |
| 評価・換算差額等   |                    |             |     |                  |             |       |                  |             |       |
| その他の有価証券   |                    | JPY         |     |                  | JPY         | 6.30  |                  | JPY         | 7.00  |

# Japan periods merged logically



Periods merged by FY date, e.g,  
1<sup>st</sup> Qtr, 2<sup>nd</sup> Qtr, 3<sup>rd</sup> Qtr  
semi-annual,  
annual

(does not consider context's  
calendar date or reported-on date)



# Each period a separate submission

- ▶ A period's instance document is accompanied by the period's taxonomy
  - Not the same from period to period
  - Different detailed line items
  - Different minority report line items
- ▶ Merging single entity multiple periods has same challenges as merging separate entities for same period

# Items tree-merged by concept

The screenshot shows the Xbrl Viewer interface with a financial statement table for the year 2006. The table is organized by concept and company. A purple oval highlights a section of the items tree, specifically the '純資産の部' (Equity section) and '株主資本' (Shareholders' Equity) items. The table columns represent different companies: eE00051 前田建設工業株式会社, eE00052 大成建設株式会社, and eE00053 清水建設株式会社. The rows show various financial metrics such as 資本金 (Paid-up Capital), 資本剰余金 (Capital Surplus), 利益剰余金 (Retained Earnings), 自己株式 (Treasury Stock), and 株主資本合計 (Total Shareholders' Equity).

| Concept  | 2006 |             |     | 2006        |       |     | 2006        |     |       | Concept |
|----------|------|-------------|-----|-------------|-------|-----|-------------|-----|-------|---------|
|          | 金額1  | 金額2         | その他 | 金額1         | 金額2   | その他 | 金額1         | 金額2 | その他   |         |
| 純資産の部    |      |             |     |             |       |     |             |     |       |         |
| 株主資本     |      |             |     |             |       |     |             |     |       |         |
| 資本金      |      | JPY 23,454  |     | JPY 112,448 | 5.60  |     | JPY 74,365  |     | 4.00  |         |
| 資本剰余金    |      | JPY 31,709  |     | JPY 79,475  | 4.00  |     | JPY 43,185  |     | 2.30  |         |
| 利益剰余金    |      | JPY 104,235 |     | JPY 74,892  | 3.80  |     | JPY 118,790 |     | 6.40  |         |
| 自己株式     |      | △JPY 2,491  |     | △JPY 179    |       |     | △JPY 1,090  |     |       |         |
| 株主資本合計   |      | JPY 156,908 |     | JPY 266,636 | 13.40 |     | JPY 235,250 |     | 12.70 |         |
| 評価・換算差額等 |      |             |     |             |       |     |             |     |       |         |
| その他の有価証券 |      | JPY         |     | JPY         | 6.30  |     | JPY         |     | 7.00  |         |

(sparse leaf nodes elided)

# Tree-merge is challenging



Concept trees can't be merged on element name: inconsistent between periods and entity extensions

A unique label was added to be used for level-finding and tree-branch merging

# Achieving server performance

- ▶ XBRL instance + taxonomy
  - Per period per entity
    - Entity taxonomy not common across periods
    - 50-150MB footprint
- ▶ A set of 10 entities \* 3 yrs (for just 1 user!)
  - Nearly 1 GB footprint
  - ½ to 1 minute server time
- ▶ Caching strategy achieved performance
  - Few seconds to load and merge
  - About 20 MB footprint

# Caching approach

- ▶ Pre-process each instance document
  - Home-made strings intern (for immediate GC)
  - Serialize hash-info for tree-merging
  - Serialize visualization object model
  - Focus on GC-able sessions
- ▶ Used binary serialization for speed

# End users need data capture

- ▶ Web screen is nice to browse but
  - End users probably want the data, not the view
- ▶ One button captures CSV to browser
  - Renders in Excel or something equivalent



# CSV to Local CSV (Excel)

The screenshot shows the Microsoft Excel interface with a CSV file open. The top toolbar has a pink circle around the 'CSV保存' (Save as CSV) button. The spreadsheet content is as follows:

|    | A            | B            | C           | D        | E            | F           | G        | H            | I       | J  |
|----|--------------|--------------|-------------|----------|--------------|-------------|----------|--------------|---------|----|
| 1  | コンセプト        | 2006 eE00051 | 前田建設工業株式会社  |          | 2006 eE00052 | 大成建設株式会社    |          | 2006 eE00053 | 清水建設株式会 |    |
| 2  |              | 金額1          | 金額2         | その他      | 金額1          | 金額2         | その他      | 金額1          | 金額2     | その |
| 3  | 有価証券報告書      |              |             |          |              |             |          |              |         |    |
| 4  | 第一部【企業情報】    |              |             |          |              |             |          |              |         |    |
| 5  | 第5【経理の状況】    |              |             |          |              |             |          |              |         |    |
| 6  | 【連結財務諸表等】    |              |             |          |              |             |          |              |         |    |
| 7  | 【連結財務諸表】     |              |             |          |              |             |          |              |         |    |
| 8  | 【連結貸借対照表】    |              |             |          |              |             |          |              |         |    |
| 9  | 連結貸借対照表      |              |             |          |              |             |          |              |         |    |
| 10 | 純資産の部        | —            | —           |          | —            | —           | —        | —            | —       | —  |
| 11 | 株主資本         | —            | —           |          | —            | —           | —        | —            | —       | —  |
| 12 | 資本金          | —            | JPY 23,454  |          | —            | JPY 112,448 | 5.6      | JPY 74,365   |         |    |
| 13 | 資本剰余金        | —            | JPY 31,709  |          | —            | JPY 79,475  | 4        | JPY 43,185   |         |    |
| 14 | 利益剰余金        | —            | JPY 104,235 |          | —            | JPY 74,892  | 3.8      | JPY 118,790  |         |    |
| 15 | 自己株式         | —            | △JPY 2,491  |          | —            | △JPY 179    | —        | △JPY 1,090   |         |    |
| 16 | 株主資本合計       | —            | JPY 156,908 |          | —            | JPY 266,636 | 13.4     | JPY 235,250  |         | 12 |
| 17 | 評価・換算差額等     | —            | —           |          | —            | —           | —        | —            |         | —  |
| 18 | その他有価証券評価差額金 | —            | JPY 33,758  |          | —            | JPY 124,240 | 6.3      | JPY 129,471  |         |    |
| 19 | 繰延ヘッジ損益      | △JPY 45      | —           |          | △JPY 78      | —           | —        | —            |         |    |
| 20 | 土地再評価差額金     | JPY 21,169   | —           | 1.1      | JPY 20,030   | —           | 1.1      | —            |         |    |
| 21 | 為替換算調整勘定     | △JPY 579     | —           | —        | △JPY 864     | —           | △0.10    | —            |         |    |
| 22 | 繰延ヘッジ損益      | —            | JPY 136     | —        | —            | △JPY 393    | —        | —            |         |    |
| 23 | 土地再評価差額金     | —            | △JPY 999    | ※3 △0.10 | —            | △JPY 981    | ※2 △0.10 | —            |         |    |
| 24 | 為替換算調整勘定     | —            | △JPY 31     | —        | —            | △JPY 761    | —        | —            | △JPY 77 |    |
| 25 | 評価・換算差額等合計   | —            | JPY 33,727  | —        | —            | JPY 122,616 | 6.2      | JPY 150,016  |         |    |
| 26 | 少数株主持分       | —            | JPY 5,759   | —        | —            | JPY 32,478  | 1.6      | JPY 7,664    |         |    |
| 27 | 純資産合計        | —            | JPY 196,394 | —        | —            | JPY 421,731 | 21.2     | JPY 392,931  |         | 2  |

# Other technologies

- ▶ Formulas
  - Integrate multiple instances
- ▶ Versioning
  - Maps namespaces and local names
  - Update linkbase structures
- ▶ Relational databases
  - Efficient very-large fact bases
  - Join and query engines



# XBRL Formula applicability

- ▶ Transform input instances(s) to output
- ▶ Proposed extensions for multiple input instances of separate DTSES
- ▶ Declarative means to specify of multi-entity merging

# XBRL Versioning Specification

- ▶ Provides inter-DTS mappings of
  - Local Name
  - Namespace
  - Linkbase positional changes
- ▶ Could be used to:
  - Merge same entities from different periods
  - Merge different submissions to common line items
  - Support database processing (discussed later)

# Versioning – now profile based

- ▶ 1) Base
  - URI mapping: namespaces, ELR's
  - actions, categories, assignments, documentation
- ▶ 2) Concept-basic
  - name, namespace, add/delete/split/merge
- ▶ 3) Concept-extended
  - attributes, labels, references
- ▶ 4) Relationships
  - add/delete... attributes
- ▶ 5) Dimensions
- ▶ 6) Resource-parts
  - link:part, formulae, ...

# Databases: multi-entity efficiency

- ▶ Experience with XBRL Gateway highlights
  - Issues of multi-instance processing *in XBRL (DOM)*
  - Need for fast tree-merge and concept mapping
- ▶ Versioning spec now provides
  - Profiles to support name/namespace mappings, label mappings, presentation differences
- ▶ Database stores instance data in neutral surrogate form
  - Efficient join logic to map to each submission DTS

# Database engines

- ▶ Efficient parallel processing architecture
- ▶ Wide availability of XQuery interfaces
- ▶ Ability to search, join, and map
  
- ▶ Probably footprint of most databases about same as probably footprint of any XBRL processor with multiple instances active in XBRL-DOM form

# Database key benefits

- ▶ As-filed document retention
  - instance and DTS
- ▶ Efficient access to fact base
  - Associative and small footprint processing
  - Versioning-based name and namespace mappings
- ▶ Metadata-based query
  - DTS fully supported
  - Efficient tree manipulation
  - Versioning supported
  - Formula with multi-instance support

# Main points

- ▶ Multi-entity rendering means
  - Merging
    - Line item semantics
    - Dimensional semantics
    - Period versions of models
  - Rendering tooling issues
    - Online
    - Local
  - Technology
    - Data promoted into XBRL
    - Data processed by efficient databases

# Questions

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THANK YOU!