SQL Access to XBRL Historical Data: A Continuous Benchmarking Story

Eric E. Cohen
Mr. Cohen: Before Presentation, Add an Icebreaker slide.
Business Reporting Supply Chain

Processes

- Business Operations
- Internal Business Reporting
- External Business Reporting
- XBRL Global Ledger Framework
- “Financial Reporting”
- Investment, Lending, Regulation
- Economic Policymaking

Participants

- Companies
- Financial Publishers and Data Aggregators
- Investors
- Central Banks
- Trading Partners
- Management Accountants
- Internal Auditors
- External Auditors
- Regulators and Administrators

Software Vendors and Service Providers
XBRL Data Beginning to Proliferate

2011: 8000 more companies in Year 3

2010: 1200 more companies in Year 2

2009: 500 companies in Year 1

SEC
- Interactive Data Mandate 33-9002 already underway
- Mutual Funds Risk-Return begins 2011

Other sources include:
- US FDIC
- Numerous global regulators (e.g., ISA)

If we can’t helium or curium, we barium
Exposes Information as Data Points

For example: Segmental Reporting
Theory: Exploiting Linked Segmental Reporting
Who is buying what from whom? (and, by extension, who is selling what to whom)?

Company Z goes bankrupt – what is the potential impact?
Reverse Lorenzian Effect
Aka One Bad Apple Effect

Edward Lorenz
Enabling the Lorenzian Web

Example: Customer/Vendor

A
• D
• E

B
• F
• G

C
• B
• H

The volume of a pizza with radius $z$ and height $a$ is $\pi z^2 a$
XBRL Turns This Into Data
What to Follow

What do leading and lagging indicators mean?
How can this best be visualized/interpreted/leveraged?
Quantum Reporting: Particles and Waves
Some Industries Already Represented

306 SIC Codes

<table>
<thead>
<tr>
<th>Industry</th>
<th>Filings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Petroleum &amp; Gas</td>
<td>145</td>
</tr>
<tr>
<td>Power</td>
<td>138</td>
</tr>
<tr>
<td>REITS</td>
<td>165</td>
</tr>
</tbody>
</table>

- 306 SIC Codes
- 96 > 10 filings
- 44 > 20 filings
- 22 > 30 filings
- 16 > 40 filings
- 14 > 50 filings
- 10 > 60 filings
- 8 > 70 filings
Benefit of Waves

- Certain disclosures only required annually
- Offset of filings means data/trends can be refreshed more often - with sufficient population of data; pseudo-continuous
- Up to date picture, however grainy
“TCP/IP” for Business Information

Exploring the ever-changing “business reporting web”
What’s a tachyon? A gluon that hasn’t dried.
Frictionless versus Aerodynamic
Value to Benchmarking

• Performance indicators are relative
  – Sales are up 100% (yay!)
  – (but the competitor’s sales are up 200%) (boo!)

The past, the future and the present walk into a bar. It was a tense day.
Purpose of Benchmarking in the Lorenzian Web

- **XBRL-specific**
  - How do my filings compare with others in the industry?

- **Performance issues**
  - How does my performance compare with others in my industry?

- **Investing**
  - How should my investing strategy change?

- **Operations**
  - Where should I concentrate marketing efforts?
  - What companies or industries are riskier than they were?

Then he ordered a drink. A tachyon walked into a bar.
What Does This Require?

Agreement at an increasingly detailed, granular level.

Quality in selection and creation
Geographical Analysis

AggregateGeographicalMember
AmericaMember, AmericasMember, AmericasOtherThanUSMember
ArgentinaMember
AsiaMember, AsiaPacificMember, AsiaPacificTimeshareResortsMember, AustralasiaAndOtherMember, AustraliaMember, AustralianDollarsMember
BarraGrandeMember
BelgiumMember
BrazilMember
BronxNYMember
BulgariaMember
BusinessIntersegmentEliminationsDomesticMember,
BusinessIntersegmentEliminationsInternationalMember,
BusinessIntersegmentEliminationsMember
CanadaMember
CentralEasternEuropeMember
ChileMember
ChinaMember
ColombiaMember
ColumbiaRiverMember
ConsolidatedMember, CorporateAndEliminationsMember,
CorporateMember, CorporationMember
CostaRicaMember
DampierGasPipelineMember
DE
DiabloCanyonMember
DomesticMember
EAMEMember
EastStLouisSiteMember
EMEAMember
EmergingBusinessesMember, EmergingMarketsMember
EsteirtoProjectMember
EulessTXMember
EuropeAndAsiaRMember
EuropeanMarketsMember
EuropeanTimeshareAndFractionalBusinessMember
EuropeMarketsMember
EuropeMember
EuropeMiddleEastAndAfricaMember
FinlandMember
ForeignCountriesMember, ForeignCountryMember
ForeignCurrencyTranslationEurosMember
Pennies were once made of steel, but CU later
Geographical Analysis

OtherMember

OtherOperatingSegmentMember
OutsideUnitedStatesMember
PittsburghPAMember
PortovesmeSiteMember
ReconcilingItemsMember
RefineryMember
RubyPipelineMember
SalesOfTradeAccountsReceivableAsiaPacificMember
SalesOfTradeAccountsReceivableEuropeMember
SalesOfTradeAccountsReceivableNorthAmericaMember
ScotlandMember
SegmentGeographicalGroupsOfCountriesGroupOneMember,
SegmentGeographicalGroupsOfCountriesGroupThreeMember,
SegmentGeographicalGroupsOfCountriesGroupTwoMember
SerraDoFacaoProjectMember
SoutheastMember
SouthwestMember
SpainMember
StateFourMember, StateOneMember, StateThreeMember,
StateTwoMember
SwitzerlandMember
TaiwanMember
TariffsGrantedBySpainMember
ThePhilippinesMember
TotalFromOperationsMember,
TotalReportableSegmentsMember, TotalSalesMember
TucsonAZMember
TucsonAZPreferredEquityMember
TurkeyMember
UkAndJapanOperationsMember
UnitedKingdomMember
UnitedKingdomMoneyMarketLineBorrowingMember
UnitedStatesAndCanadaMember
UnitedStatesDollarsMember
UnitedStatesMember
US
USAndPuertoRicoMember
USMember
USOperationsMember
USSmeltersMember
USSourcesMember
VancouverSmelterSiteMember
VariousSitesMember
VE
VenezuelaMember
WesternEuropeMiddleEastAfricaMember
WorldwideMember
Frictionless Data

• Starting up from rest on a frictionless surface is not an intuitive task, due to Newton’s 3\textsuperscript{rd} Law

• Until you have a start, you don’t know if you are going anywhere!

What works after it is fired? A neuron.
Getting at Data

• Data query languages and techniques
• Commercial sources
• Collaborative sources
Things to Do With XBRL

• View it
• Audit it
• Analyze it
• Transform it
• Move it <- I like to do this
Readily Available Tooling

• View it
  – SEC Open Source Rendering Tool

• Query it
  – SQL
  – XQuery
  – Transform and then use other tools
    • SPARQ
    • SQL and other traditional database tools
10. Entire Agreement

This License Agreement represents the complete agreement of Licensor and Licensee concerning subject matter hereof. If any provision of this License is held to be unenforceable, such provision shall be reformed only to the extent necessary to make it enforceable.

12. Choice of Law

This Agreement shall be interpreted in accordance with the federal common law as interpreted by the U.S. District Court for the District of Columbia and its reviewing courts.

13. Indemnity

Licensee agrees to indemnify and hold Licensor harmless from any and all claims, demands, causes of action, damages, judgments and attorney’s fees and costs arising from Licensee’s using, offering, selling, promoting, or distribution of the Rendering Engine Source Code.

- Download the Rendering Engine configurable binary distribution (Note: 17 MB)
- Download the Rendering Engine source code (Note: 55 MB) (We suggest working with the configurable binary distribution before the source code.)

http://www.sec.gov/spotlight/xbrl/renderingenginelicense.htm

Command-line tool
XSLT transformation

Read and follow directions:

MS-DOS skills
Text editing skills
XSL handling skills
Commercial Software

• Example:
  – Excel-based tooling
    • IMetrix
    • Xinba
What is Xinba

- Xinba is an XBRL viewer.
  - Users can view XBRL within Excel.
  - Users can also create templates to show XBRL their own way.

Xinba provides Excel functions to get specific XBRL values into cells.
Open with standard sheet

- Set company to the company selection window and click OK.
<table>
<thead>
<tr>
<th>Balance sheet</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Cash and Cash Equivalents</td>
<td>33,751,000,000</td>
<td>33,751,000,000</td>
<td>26,859,000</td>
</tr>
<tr>
<td>Marketable Securities - Current</td>
<td>8,593,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Loaned securities</td>
<td>6,746,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Financing Receivables</td>
<td>108,858,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Receivables, Net</td>
<td>8,089,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Net investment in operating leases</td>
<td>32,493,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Retained interest in sold receivables</td>
<td>474,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Inventories, Net</td>
<td>11,721,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Investment in Affiliates</td>
<td>3,120,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Property, Plant and Equipment, Net</td>
<td>37,007,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>3,331,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Goodwill and other intangible assets</td>
<td>2,064,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets of discontinued/held-for-sale operations</td>
<td>10,002,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Other Assets</td>
<td>16,664,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Assets</td>
<td>262,913,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liabilities and Stockholders' Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accounts Payable</td>
<td>23,964,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Accrued liabilities and deferred revenue</td>
<td>72,858,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Long-Term Debt</td>
<td>169,205,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Deferred income taxes</td>
<td>2,901,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liabilities of Discontinued Operations - Current and Noncurrent</td>
<td>5,408,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Liabilities</td>
<td>274,336,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Minority Interest</td>
<td>1,466,000,000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stockholder's Equity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Capital stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Stock</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common Stock - Description</td>
<td>Common stock, par value $0.01 per share</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Open with template

- Open with standard sheet
  - Set company to the company selection window and click OK.
- Select template
SQL

• A “standard”
  – ANSI/SQL (1986)
  – Variants
    • Oracle
    • Postgres
    • Many others
Examples of SQL Tools

• General
  – Altova DatabaseSpy (30 day eval)
    • [www.altova.com](http://www.altova.com)
  – RazorSQL
    • [www.razorsql.com](http://www.razorsql.com)

• For Postgres (XBRL US database)
  – [pgAdmin III (open source)](http://www.pgadmin.org/)
Tools with SQL

• Fujitsu XWand
  – Documentation in text file
    • readme-SQLPlugin.txt
Query Syntax

```
select [distinct] <expression>[, <expression>...]  
from <table_name> [, <table_name>...]  
[where <condition>]  
[group by <expression> [, <expression>...]]  
[having <condition>]  
[order by <expression> [asc | desc],  
[<expression> [asc | desc]]..]
```
SELECT

• What do you want returned
• Fields, calculated and derived information
• Need to know your choices

• Can see just about everything by using the wild card “*”, and then narrow down from there.
FROM

It’s all about the data sources
Actual or virtual
WHERE

• Conditions driving which records are selected
  – Used for linking key fields between disparate tables
  – Providing other statements that provide Boolean responses (you are in, or you are out)
ORDER BY

• Sort the information
Tooling and Resources

• XBRL Data Sources
• Tooling
Repositories: XBRL US CSuite
Specialize for XBRL

• Actual approach – used in XBRL US historical analyses
  – Very normalized
  – Qname information accessible for many purposes

• Virtual approach – used by Fujitsu for accessing information in individual filings
XBRL US Historical Company Analysis

```
-- Schema: "public"

-- DROP SCHEMA public;

CREATE SCHEMA public
  AUTHORIZATION postgres;
GRANT ALL ON SCHEMA public TO postgres;
GRANT USAGE ON SCHEMA public TO xbrl_view_only;
GRANT ALL ON SCHEMA public TO xbrl_admin;
COMMENT ON SCHEMA public IS 'standard public schema';
```
Non-Trivial from Normalized Database

• SELECT entity.entity_id, entity.entity_name, accession.accession_id, accession.filing_accession_number, context.context_id, context.context_xml_id, context.period_start, context.period_end, context.period_instant, context_dimension.context_dimension_id, contextdimensionqname.local_name AS context_dimension_qname, element.element_id, elementqname.local_name AS element_qname, elementbasedatatypeqname.local_name AS element_base_datatype, elementdatatypeqname.local_name AS element_datatype, elementsubgroupqname.local_name AS element_substitution_group, element.balance_id AS balance_code,
  • CASE
  • WHEN element.balance_id = 1 THEN 'Debit':text
  • WHEN element.balance_id = 2 THEN 'Credit':text
  • ELSE NULL::text
  • END AS balance, element.period_type_id AS period_type_code,
  • CASE
  • WHEN element.period_type_id = 1 THEN 'Instant':text
  • WHEN element.period_type_id = 2 THEN 'Duration':text
  • WHEN element.period_type_id = 3 THEN 'Forever':text
  • ELSE NULL::text
  • END AS period_type
  • element.abstract, element.nillable, fact.fact_id, fact_fact_value, unit.unit_id, unit.unit_xml_id, unit_measure.unit_measure_id, unitmeasureqname.local_name AS unit_measure_qname, unit_measure.location_id AS location_code,
  • CASE
  • WHEN unit_measure.location_id = 1 THEN 'measure':text
  • WHEN unit_measure.location_id = 2 THEN 'numerator':text
  • WHEN unit_measure.location_id = 3 THEN 'denominator':text
  • ELSE NULL::text
  • END AS location
  • FROM fact
  • JOIN accession ON fact.accession_id = accession.accession_id
  • JOIN entity ON accession.entity_id = entity.entity_id
  • JOIN qname elementqname ON element.qname_id = elementqname.qname_id
  • JOIN qname elementbasedatatypeqname ON element.xbrl_base_datatype_qname_id = elementbasedatatypeqname.qname_id
  • JOIN qname elementdatatypeqname ON element.datatype_qname_id = elementdatatypeqname.qname_id
  • JOIN qname elementsubgroupqname ON element.substitution_group_qname_id = elementsubgroupqname.qname_id
  • JOIN context ON fact.context_id = context.context_id
  • LEFT JOIN context_dimension ON context_dimension.context_dimension_id = context.context_id
  • LEFT JOIN qname contextdimensionqname ON context_dimension.qname_id = contextdimensionqname.qname_id
  • LEFT JOIN qname contextdimensionmemberqname ON context_dimension.member_qname_id = contextdimensionmemberqname.qname_id
  • LEFT JOIN unit ON fact.unit_id = unit.unit_id
  • LEFT JOIN unit_measure ON unit_measure.unit_id = unit.unit_id
  • LEFT JOIN qname unitmeasureqname ON unit_measure.qname_id = unitmeasureqname.qname_id
  • ORDER BY entity.entity_id, accession.accession_id, context.context_id, elementqname.local_name;
Using Fujitsu XWand’s Data Query Tools

Use “simple” SQL commands to select and report data

Review on-screen, Cut-and-paste or export to CSV

Note: Freely licensed for academic, consortium use

http://www.fujitsu.com/global/services/software/interstage/xbrltools/
Many Uses; Hidden Power
Query Syntax

The query syntax is as follows:

```sql
select [distinct] <expression>[, <expression>...] from <table_name>[, <table_name>...] 
[where <condition>]
[group by <expression> [, <expression>...]]
[having <condition>]
[order by <expression> [asc | desc], [<expression> [asc | desc]]..]
```

Note: If you specify "distinct", duplicated rows (if any) will be removed.
Select

• Data fields necessary for each area of information
Select Clause

- You can specify multiple items. In such a case, specify them by separating them with comma (",").
- When you specify "*", it will include all potential columns in a given table.
- When you use “distinct” it eliminates duplicates.
- Users are encouraged to specify "*" to create an inventory of which columns are available in a given table.
SUPPORTED FUNCTIONS

- String functions
  
  concat(str1, str2 [, str3...]) ... Returns concatenated string

  length(str) ... Returns the length of a string

  lower(str) ... Returns the argument in lowercase

  substr(str, startIndex, length) ... Return the substring of a string

  upper(str) ... Returns the argument in uppercase

  instr(str, searchstr, [,position [, occurrence]])
  ... Returns the start position of searchstr within str.
  Returns 0 if searchstr is not found.
Expression

- You can specify
  - Column names
  - Operators
    - (e.g. +, -, *, /)
  - Functions,
  - Number/string literals

```sql
select [distinct] <expression>[, <expression>...] from <table_name> [, <table_name>...]
[where <condition>]
[group by <expression> [, <expression>...]]
[having <condition>]
[order by <expression> [asc | desc], [<expression> [asc | desc]]..]
```
Aliases: Column Names

• You can specify an alias column name using the "as" keyword.
  – Example:
    • `select value as v from fact where v > 0`
• This is especially helpful when you wish to apply multiple conditions against the same column.
• You do lose the more specific identification of the field in the views
From

• Sources
  – Tables
  – Views/other queries
<table>
<thead>
<tr>
<th>table name</th>
<th>data content</th>
<th>note</th>
</tr>
</thead>
<tbody>
<tr>
<td>file</td>
<td>files in DTS/instance</td>
<td>-</td>
</tr>
<tr>
<td>element</td>
<td>element list</td>
<td>Resolved links only</td>
</tr>
<tr>
<td>presentation</td>
<td>presentation link</td>
<td>Resolved links only.</td>
</tr>
<tr>
<td>calculation</td>
<td>calculation link</td>
<td>Resolved links only.</td>
</tr>
<tr>
<td>definition</td>
<td>definition link</td>
<td>Resolved links only.</td>
</tr>
<tr>
<td>label</td>
<td>label link</td>
<td>Resolved links only.</td>
</tr>
<tr>
<td>reference</td>
<td>reference link</td>
<td>Resolved links only.</td>
</tr>
<tr>
<td>unresolvedpresentation</td>
<td>presentation link</td>
<td>All links.</td>
</tr>
<tr>
<td>unresolvedcalculation</td>
<td>calculation link</td>
<td>All links.</td>
</tr>
<tr>
<td>unresolveddefinition</td>
<td>definition link</td>
<td>All links.</td>
</tr>
<tr>
<td>unresolvedlabel</td>
<td>label link</td>
<td>All links.</td>
</tr>
<tr>
<td>unresolvedreference</td>
<td>reference link</td>
<td>All links.</td>
</tr>
<tr>
<td>roletype</td>
<td>role type</td>
<td></td>
</tr>
<tr>
<td>arcroletype</td>
<td>arcrole type</td>
<td></td>
</tr>
<tr>
<td>context</td>
<td>context</td>
<td>Instance only</td>
</tr>
<tr>
<td>unit</td>
<td>unit</td>
<td>Instance only</td>
</tr>
<tr>
<td>fact</td>
<td>item</td>
<td>Instance only</td>
</tr>
<tr>
<td>footnote</td>
<td>footnote link</td>
<td>Instance only</td>
</tr>
<tr>
<td>calculationerror</td>
<td>facts with calculation error</td>
<td>Instance only</td>
</tr>
</tbody>
</table>
Alias for Table Names

• You can specify an alias table name using the "as" keyword as follows:
  – select f.value, l.label from fact as f join label as l on f.element = l.element
Expression: Example

select value / 1000000, length(elementname), 100, "foo" from fact

Returns as columns

1. The “value” divided by 1,000,000
2. The length in characters of the element name,
3. The number “100”
4. The word “foo”
From Clause

• Inner Join
  – You can use inner join by following syntax:
    • `<table name1> join <table name2> [on <condition>]`

• Joining multiple tables
  – If you want to join more than two tables, use parenthesis as follows:
    • `( <table name1> join <table name2> [on <condition>] )
      join <table name3> [on <condition>]`
Subqueries in From Clause

• Example:
  – select element from (select * from fact where value < 0)
Where Clause

• In a "where" clause, you can specify
  – the formula of "<expression> <comparison_operator> <expression>" and
  – "not", "and", and "or".
• The <comparison_operator> is any one of
  – {"=" , "!=" , "<" , ">" , "<=" , ">="}.
• You can use "in" conditional operator by following syntax:
  – <column name> "in" "(" <select statement> ")"
    • Return true when selected column value exists In the result of select statement following to "in".
Where Clause

• "" for exact match

• You can use a regular expression (embraced with slash (/) or backslash(\)) with the operator "=" or "!='.
  – Used for “contains” rather than “equals”
  – // for contains match

• //i for case insensitive match
  – The lower() function (e.g., “select element as v, value from fact where lower(v) = /cash/”) can serve similar purpose

• /^/ for starts with match

• /$/ for ends with match
Where Clause

- Use the decimal point "." as a wild card for any single character.
  - /t.x/i will return anything with text or tax in it.
- Use the decimal point/asterisk combo ".*" as a wild card for any grouping of characters.
  - select * from element where element = /oil.*gas/i will match anything with oil followed by gas (ignoring case)
- Use [abc] to match a single character as either a, b or c
  - /t[ae]x/i will likewise return text or tax
- /\d/ will match any single digit
  - select * from element where element = /\d/ will return all elements with a numeric digit in them.
Order By Clause

• In a "order by" clause, you should specify a expression to be sorted accompanied by either "asc" or "desc".
  – Ascending: When you want to sort by ascending order, specify a column name and "asc“ (or leave it blank; it’s the default value)
  – Descending: When you want to sort by descending order, specify a column name and "desc"
Behavior of Items in Query Table

• The query results in Xwand are good tools for finding information elsewhere in XWand
  – When "element" is included in <table_name> and when you double-click a row of the table, the corresponding element declaration will be selected in other panes in the application.
  – Similarly, when "Value" column is included, the corresponding item of that row will be selected in other panes.
- **Union** does not retain duplicates
- **Union all** retains duplicates

```
\[ P \cap Q' \quad P \cap Q \quad P' \cap Q \quad P' \cap Q' \]
```
Union, Union All, Except, Intersect

• You can use
  – union
  – union all
  – except
  intersect operators.

• In the syntax
  – <select statement> <"union" ["all"] | "except" | "intersect"> <select statement>

• Both select statements must specify the same columns
Supported Functions: String Functions

- **concat(str1, str2 [, str3...])**
  - Returns concatenated string
- **length(str)**
  - Returns the length of a string
- **lower(str)**
  - Returns the argument in lowercase
- **upper(str)**
  - Returns the argument in uppercase
Eric’s Favorite String Functions

• \texttt{substr(str, startIndex, length)}
  – Return the substring of a string

• \texttt{instr(st, search char, startIndex)}
  – Returns the location of a specific character/word in a string.
One Possible Solution

• Select
  – segment as a,
  – instr(a, ">", 1) +1 as start,
  – instr(a, "</", start) as end,
  – substr(a, start, end - start) as textvalue

• From fact

• Where segment != ""
Supported Functions: Numeric functions

- Acts on individual amounts
  - \( \text{abs}(\text{num}) \)
    - Returns the absolute value
  - \( \text{ceil}(\text{num}) \)
    - Returns the smallest integer value not less than the argument
  - \( \text{floor}(\text{num}) \)
    - Returns the largest integer value not greater than the argument
  - \( \text{round}(\text{num}) \)
    - Rounds the argument
Supported Functions: Aggregate Functions

• Creates a single result from a group of amounts
  – avg(expr) Returns the average value
  – count("*" | expr) Returns a count of values
  – max(expr) Returns the maximum value
  – min(expr) Returns the minimum value
  – sum(expr) Returns the sum

```
select value as v, avg(v), min(v), min(abs(v)), max(v), max(abs(v)), \sum(v), count(v) from fact
```

<table>
<thead>
<tr>
<th>v</th>
<th>avg(v)</th>
<th>min(v)</th>
<th>min(abs(v))</th>
<th>max(v)</th>
<th>max(abs(v))</th>
<th>sum(v)</th>
<th>count(v)</th>
</tr>
</thead>
<tbody>
<tr>
<td>&lt;!DOCTYPE html PUBLIC...</td>
<td>218553768.608002077562327</td>
<td>-208719000</td>
<td>0</td>
<td>12843687113</td>
<td>12843687113</td>
<td>236693731402.46625</td>
<td>1083</td>
</tr>
</tbody>
</table>
XBRL functions

• Returning a specific label
  – xbrl_label(element, [lang [, labelRole [, extendedLinkRole]]])
    • Returns the label of the element. Note: The argument "element" must be the column "element" or "parentelement"

• Other functions
  – if(condition, expr1, expr2)
    • If condition is true, returns expr1. Otherwise returns expr2.
Sample Queries

• List all content from a taxonomy
  – select * from element
    • For all the columns, gets all the element declarations from the table.

• List all unique start date and end date pairs
  – select distinct StartDate, EndDate from context
    • Gets all the start dates and end dates from the context table, duplication being removed.

• Select all concepts with a label of (exactly) “Sales”
  – select Value from fact where ElementLabel = 'Sales'
    • Returns value of an item whose element label matches 'Sales'.
    • (Label language etc. are in synchronization with the application display.)
Sample Queries (Cont.)

• Select all concepts with a label of “Sales” and Value < 0
  – select ElementLabel, Value from fact where ElementLabel = /Sales/ and Value < 0
  • Returns labels and values, where 'Sales' is contained (whole or part) in the element label and the value is less than 0.

• Select all elements which are not included in the presentation
  – select element, elementlabel, value from fact where element in (select element from fact except select element from presentation)
  • Returns element names, element labels, and values of facts that will not be in the presentation link.

• Select elements and related labels from all concepts included in both instance and label linkbase
  – select element, label, value from fact join label on fact.element = label.element
  – This will join fact table and label link table with element column.
Sample Queries (Cont.)

• Note that joins are faster than non-joins
  – select element, label, value from fact, label where
    fact.element = label.element
  – Same as above, but this query is slower than the above.

• Identify if labels are duplicated
  – select label, count(*) from label group by label
    having count(*) > 1
  – Returns the count of each label that appears more than once.
## Using the Viewer’s Data Query tools (cont.)

<table>
<thead>
<tr>
<th>Query helpers</th>
<th>Search from end of the field (rightmost character match)</th>
<th>select element, value from fact where elementName = /value$/i</th>
</tr>
</thead>
<tbody>
<tr>
<td>$</td>
<td>Search from beginning of the field (leftmost character match)</td>
<td>select element, value from fact where elementName = /^cash/i</td>
</tr>
<tr>
<td>^</td>
<td>Wildcard a single character</td>
<td>Where element = /t.x/i returns tax, tex, etc.</td>
</tr>
<tr>
<td>.</td>
<td>Wildcard for any number of characters</td>
<td>select * from element where element = /oil.*gas/i will match anything with oil followed by gas (ignoring i)</td>
</tr>
<tr>
<td>.i</td>
<td>Ignore case</td>
<td>Where element = /member/i</td>
</tr>
<tr>
<td>[abc]</td>
<td>Match any of the enclosed characters</td>
<td>[abc] to match a single character as either a, b or c /t[ae]x/i will likewise return text or tax</td>
</tr>
<tr>
<td>\d</td>
<td>\d replaces a single digit</td>
<td>select * from element where element = /\d/ will return all elements with a numeric digit in them. select * from element where element = /20\d/ \d/ will catch anything that look like a year in the 21st century (four digits, starting with 20; would match 2009, 2010, 2099, etc.)</td>
</tr>
<tr>
<td>Instr(field,&quot;search term&quot;, starting char)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Substr(field, starting char, length)</td>
<td></td>
<td>select segment as a, instr(a, &quot;&gt;&quot;, 1) +1 as start, instr(a, &quot;&lt;/&quot;,start) as end, substr(a, start, end - start) as textvalue from fact where segment != &quot;&quot;</td>
</tr>
</tbody>
</table>
Random Thoughts

• What can you do with aerodynamic data?
• What can I uncover that will indicate someone else’s future actions or state upon which I can capitalize?
• The enemy of my enemy is my friend.
• The vulture does not look to the healthy animal as its next meal.
• Efficiencies often come at the cost of compromise
Appendix of Slides to be developed
Internal sources

External sources

Seamless audit trail
Frictionless data
Aerodynamic data

How often can you get
• Internal data?
• External data
  • Much larger population
  • Quarterly and annual
    • US
    • FPI