Open Sesame…
…uh, Open Saskatchewan

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GEMKO Information Group, LLC
Information Systems Specialists

DATA MANAGEMENT + BUSINESS SOFTWARE

RUNDOWN

Y ASK Y

COORS LIGHT

MOD SQUAD

BY THE RULES

ALGORE

THAT WAS THEN

THIS IS NOW

KISSIN' COUSIN

CULTURE

WITH ONE “N”

MORE...

Why are we here?...

- To help rescue the IBM i platform from three enemies:
  – Third party vendors who helped build up the platform with their offerings early on, but also helped bring it down with technical stagnancy and unfriendly licensing practices**.**
  – “Lifer” professionals who helped promote the platform with their creativity early on, but also helped bring it down with complacency and inflexibility.
  – IBM marketing, which can’t/won’t get out of its own way.
- To attempt to turn the tide from IBM i as a consumer of open source software to a producer instead.
- To introduce lifers to a new paradigm of software development.

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On tap..

- A look at two open source projects born on IBM i and driven by native tooling.
  - The Report Mods Framework (RMF).
  - Inuendo – Data’s New Direction.
- The trouble with opening up.
  - Challenges in preparing your project for open source communities.

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The Report Mods Framework (RMF)

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The back story...

- GEMKO built a solution model to help customers with overcustomized 3rd party software get out of “mods jail”.
  - Once known as Mods Externalization, now Decustomization.
  - Repeatable, proven process that includes education
- Spooled file mods are among the most common.
  - Hard coded output queues.
    - C/L source butchered.
  - Content additions or relocations.
    - RPG source butchered.
  - Conversion to other media types (CSV, PDF, etc.)
    - Multiple source types butchered.
  - Users often get emotional when it comes to their printed reports.
- A hands off alternative was needed.
  - Leave the 3rd party source alone.

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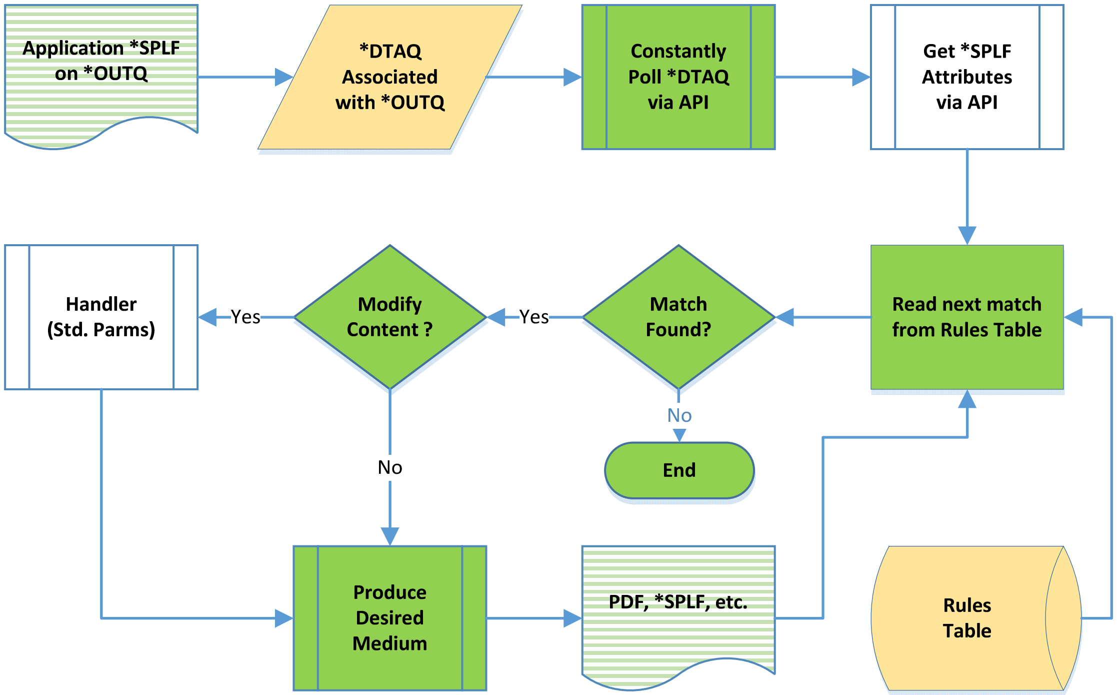
RMF Workflow


Application *SPLF on *OUTQ
*DTAQ Associated with *OUTQ
Constantly Poll *DTAQ via API
Get *SPLF Attributes via API
Read next match from Rules Table
Match Found?
Yes
Modify Content ?
Yes
Handler (Std. Parms)
No
End
No
Produce Desired Medium
PDF, *SPLF, etc.
Rules Table

The above is performed by a NEP called RPTMOD.

Wait a minute! Modify content?…....

- Yes, modify content.
- Depending on the rule, RPTMOD loads the entire spooled file into a memory grid (2 dimension array).
  - RPG size limitations cap it off at 1500 pages by 66 lines by 132 characters per line.
  - Pointer to array passed from RPTMOD to handler program.
- Access “dead” lines not visible via DSPSPLF.
- Seek out patterns to find placement points.
- Add or delete character strings, or move strings using simple RPG functions like %SUBST or %REPLACE.
- RPTMOD writes grid back out to *SPLF or PDF.
- Sample available on the download page.

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The RMF rules table……

- Identifies spooled files requiring intervention.
  - Qualifiers such as file name, program, queue, etc.
  - Kill switch to disable the rule instantly.
- Specifies the format of the finished product.
  - Spooled file, PDF, FTP stream
  - Also referred to as Transformation Type
  - HTML option not in open source, but has been used in the past.
- Provides target attributes based on type. Examples:
  - Output queue or form type for a spooled file.
  - IFS path or e-mail address for a PDF file.
    - “Buyer” beware – camps on to the native Mail Server Framework.
  - IP address for a direct FTP to a capable printer.
- Layout in downloadable user guide.
- Installation guide.
- Quick demo.

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Inuendo: Data's New Direction

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An inconvenient truth…..

- Nearly a third of the code in your application programs was written to leverage and compensate for weak data.
  - Well-designed data can do most of that work for you.
- Another 10-15% is remediation of weak data.
  - Resynchronizing buckets with detail.
  - Cleansing of orphaned records.
- Another 25% or more is cloning and patching.
- Only a small fraction of your professional expertise goes toward developing unique, strategic business rules.
  - Mull over that for a while.
- Plus, consider our legacy versus our current reality…

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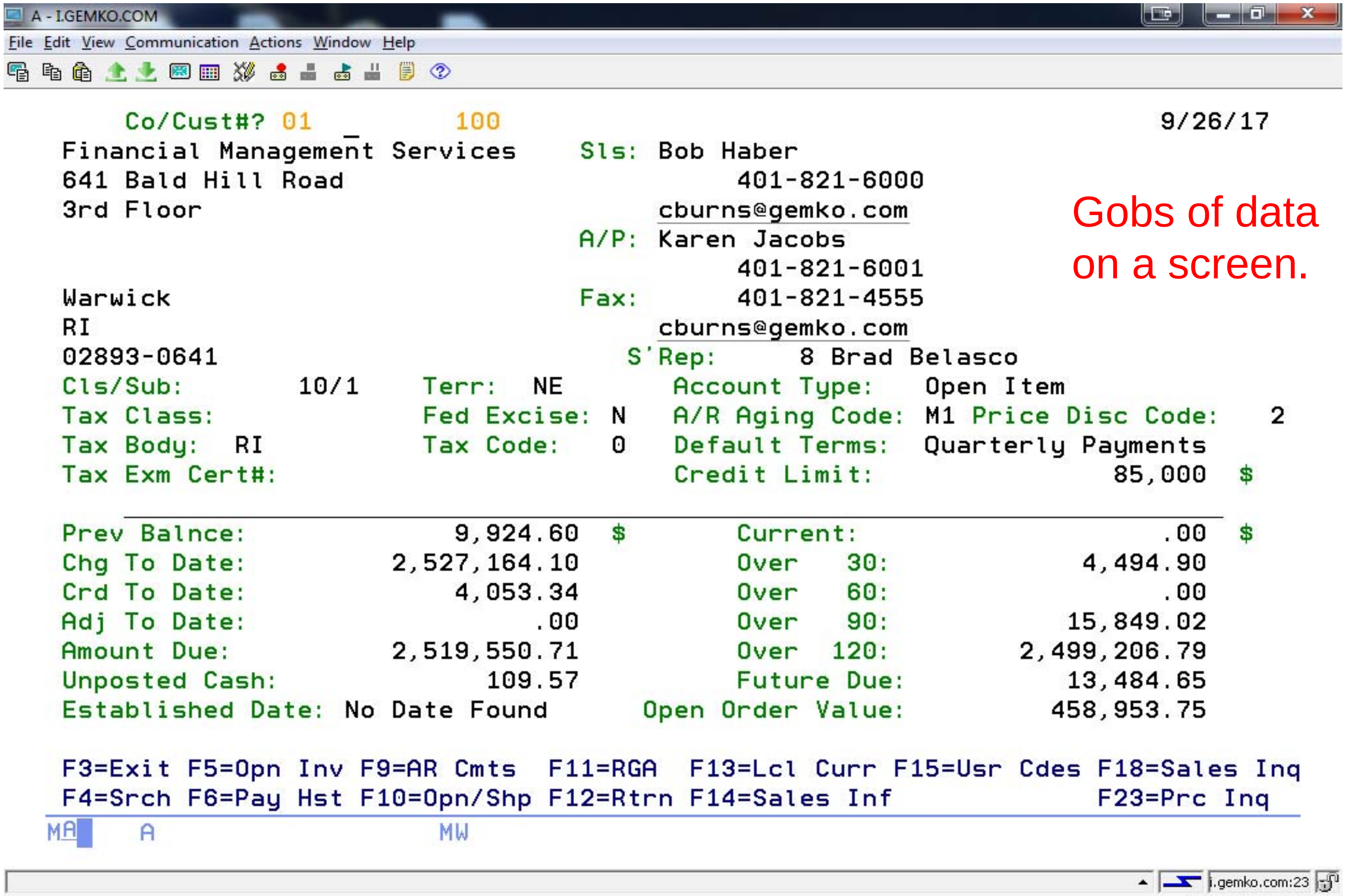
Our legacy



```
    Co/Cust#? 01 _       100                                          9/26/17
Financial Management Services    Sls: Bob Haber
641 Bald Hill Road                          401-821-6000
3rd Floor                             cburns@gemko.com
                                 A/P: Karen Jacobs
                                            401-821-6001
Warwick                          Fax:       401-821-4555
RI                                    cburns@gemko.com
02893-0641                          S'Rep:       8 Brad Belasco
Cls/Sub:        10/1     Terr:   NE        Account Type:    Open Item
Tax Class:               Fed Excise:  N    A/R Aging Code:  M1 Price Disc Code:    2
Tax Body:   RI           Tax Code:    0    Default Terms:   Quarterly Payments
Tax Exm Cert#:                             Credit Limit:              85,000   $

Prev Balnce:            9,924.60  $           Current:                   .00   $
Chg To Date:        2,527,164.10              Over   30:            4,494.90
Crd To Date:            4,053.34              Over   60:                 .00
Adj To Date:                 .00              Over   90:           15,849.02
Amount Due:         2,519,550.71              Over  120:        2,499,206.79
Unposted Cash:            109.57              Future Due:          13,484.65
Established Date:  No Date Found         Open Order Value:        458,953.75

F3=Exit F5=Opn Inv F9=AR Cmts  F11=RGA  F13=Lcl Curr F15=Usr Cdes F18=Sales Inq
F4=Srch F6=Pay Hst F10=Opn/Shp F12=Rtrn F14=Sales Inf            F23=Prc Inq
MA     A                   MW
```

Gobs of data on a screen.

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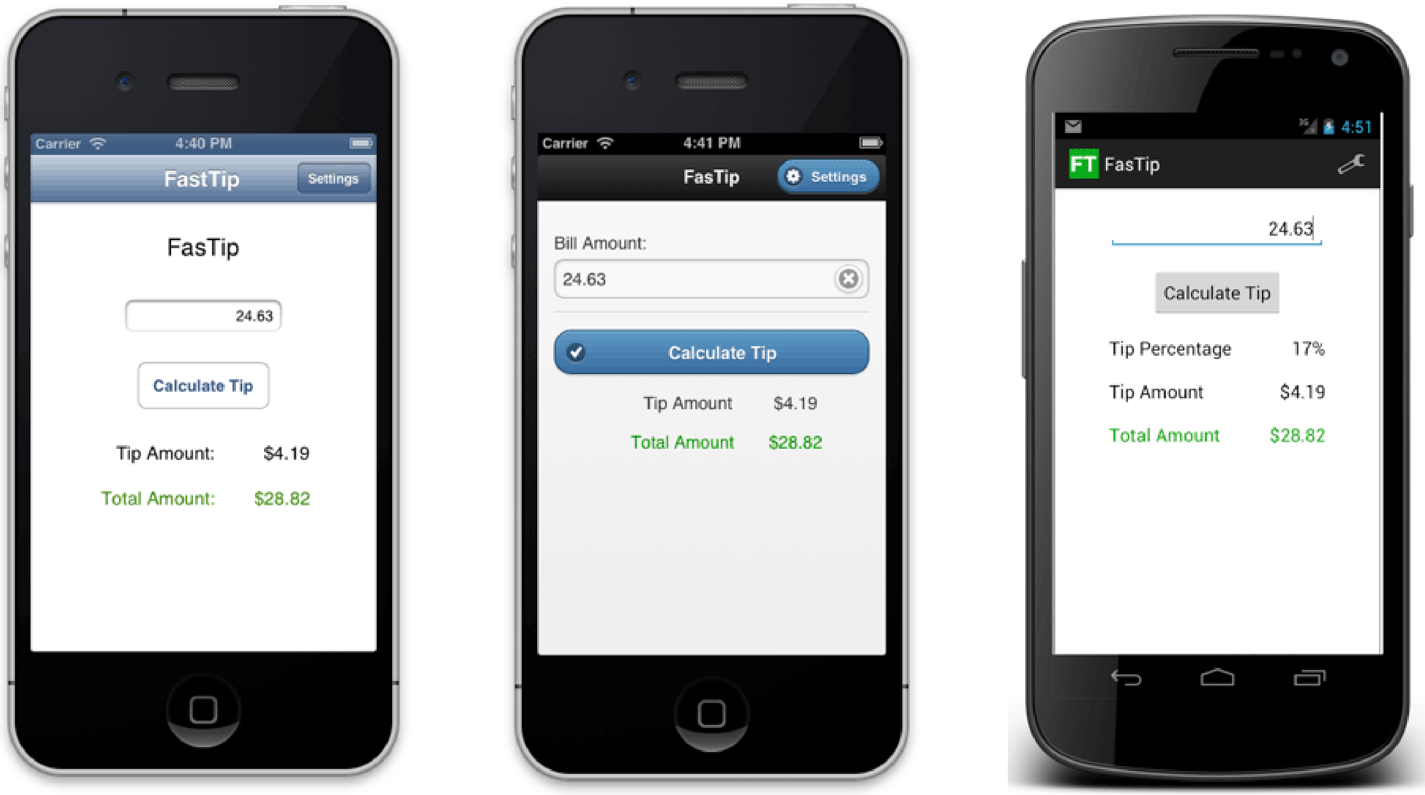
Our new reality



FasTip

24.63

Tip Amount: $4.19

Total Amount: $28.82

Bill Amount: 24.63

Tip Amount $4.19

Total Amount $28.82

24.63

Tip Percentage 17%

Tip Amount $4.19

Total Amount $28.82

Tiny bits of data on a screen.

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The back story..

- GEMKO built a solution model for modernizing home grown back office applications, a bit at a time.
  - Re-engineer select data objects using modern best practice.
    - Normalization, identity columns, constraints, data types, etc.
    - Create Data Servers to replace all Record Level Access (RLA).
  - Replicate in real time using triggers.
    - Little or no disruption to the live legacy environment.
  - Retrofit applications
    - Read-only programs first, one right after the other.
    - Update-capable programs next, implemented as a group.
  - Retire legacy data objects.
  - Review our performance, shake out any flaws.
  - Rinse & repeat with another functional area or file.
  - Included SQL & RPG education.
  - Cousin of De-Customization.
- Built a playbook for each cycle.
  - Utilize customer tech staff.

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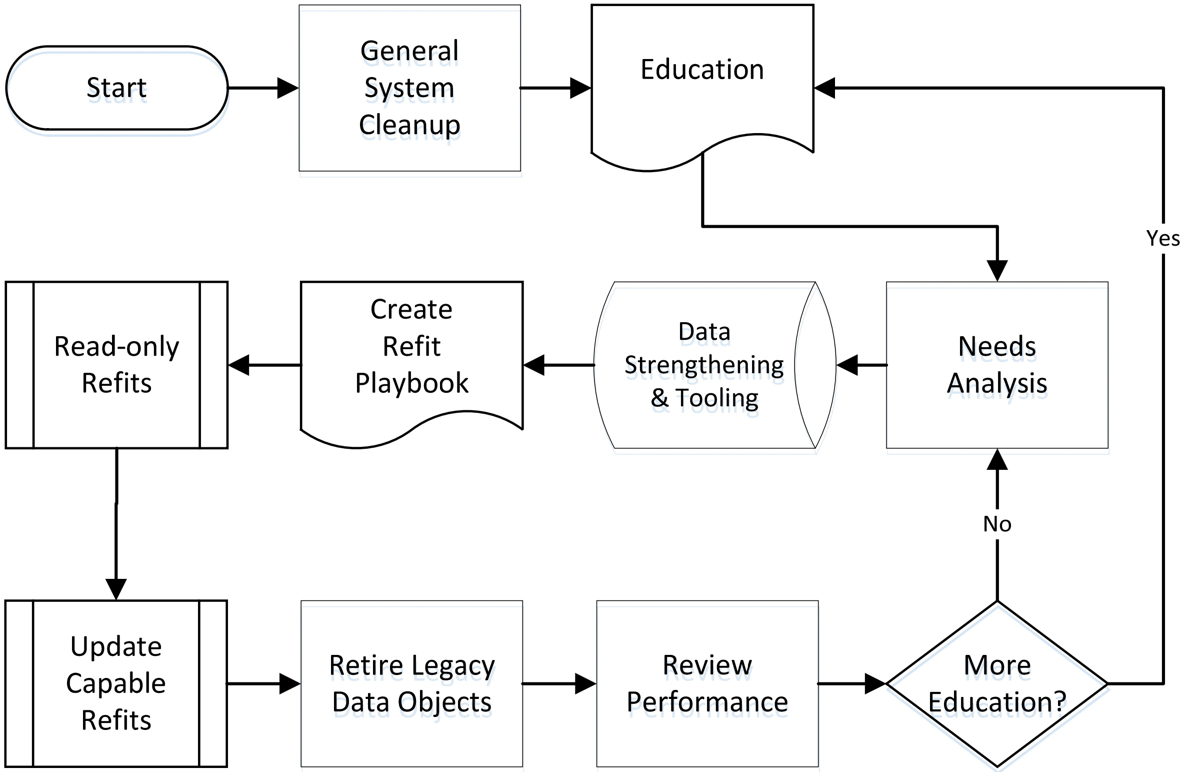
A culture, not a project



Tell me what’s missing.

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The not so back story.....

- Had good success, but:
- Each deployment was a complete custom job.
  - Standard methodology but no standard deliverable.
- Each functional area required its own structure.
  - Limited ability to leverage ROI between cycles.
- Needed a model that could be used across the entire enterprise, and at any customer.
  - Something that could endure the test of time.
  - Something more friendly to young'uns.
- CFB researched & developed outside of GEMKO.
  - White boarded in early 2010, developed over next two years.
  - R & D continues today as an open source project.

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Inuendo

Data’s New Direction

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MORE...

So just what in the world is it?...

- It’s the virtualization of data, down to the “piece of information” level (POI for short).
- Comprised of three major components:
  - Associative, chronological data model.
  - API based abstraction layer to access the model.
  - Your imagination to visualize relationships.
- And why call it that?
  - It’s all about the data, so it begins and ends with I/O.
  - It’s about implication, with an associative flavor.
  - People associate that term with sex for some reason, and sex sells, even though Inuendo is not for sale and is gender neutral.
  - The abbreviated spelling shielded it from e-mail filters. Trevor Perry nailed me on this one…repeatedly…as only he can.

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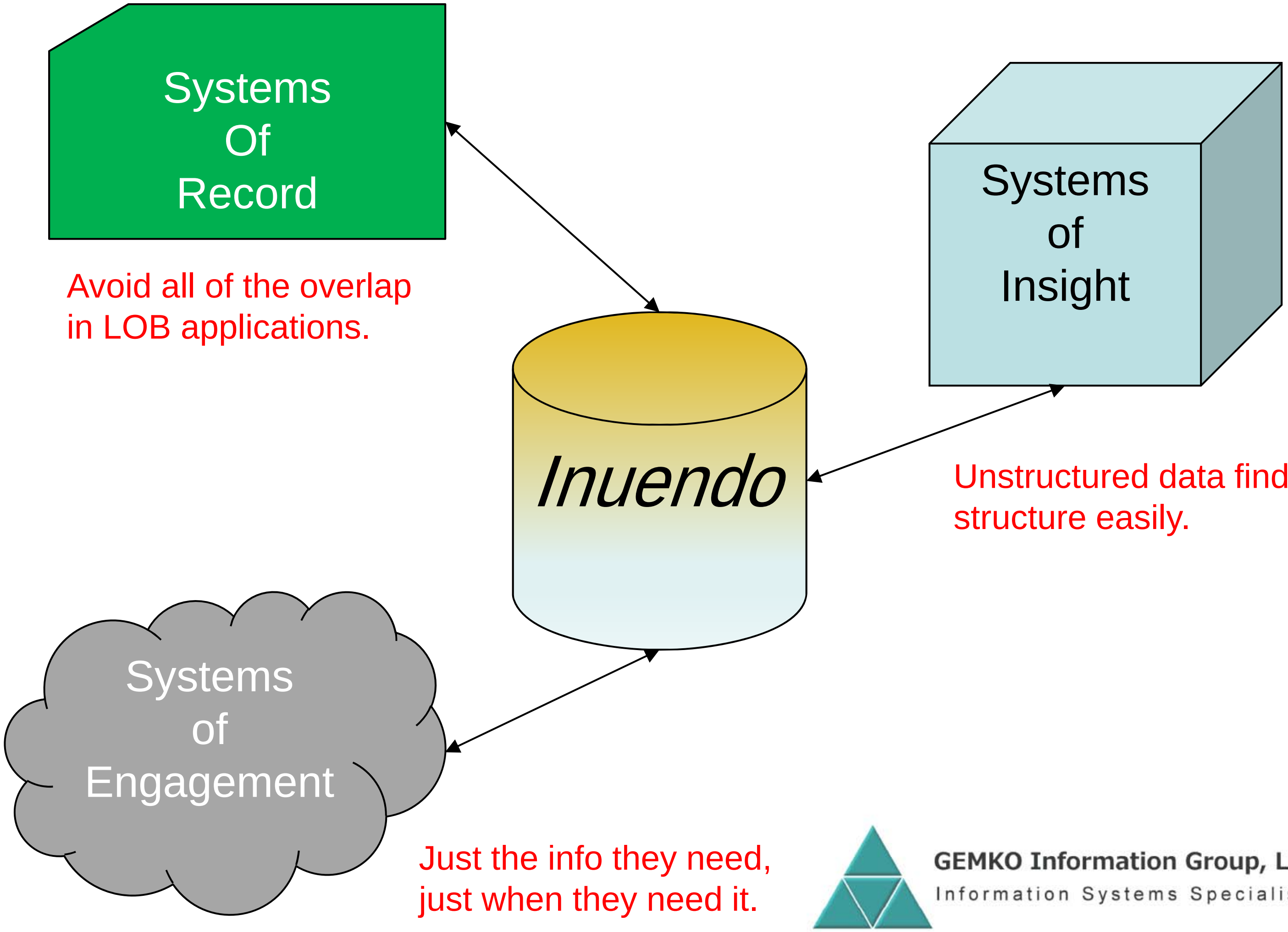
A data store for all to share



Avoid all of the overlap in LOB applications.

Unstructured data finds structure easily.

Just the info they need, just when they need it.

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Principles of Inuendo……

- All business objects, regardless of size or significance are treated equally. They are referred to as Entities.
- Entities are based on a class definition, comprised of Properties. A property is one piece of info about the Entity.
  - Similar to OO design, only described with data instead of code.
  - Property values are organized by data type, one table per type.
- Every Entity has a common set of properties that help identify and describe it. Referred to as metadata.
  - Stored in a header table. One row for every Entity across the enterprise.
  - Includes a unique identifier, class, legacy identifiers, creation stamps, etc.
- Every Entity is spawned from / subordinate to another.
  - Referred to as the Parent. The Founder is at the top of the food chain.
- Links are a data type that holds the unique ID of an Entity.
  - Provides a means to connect one Entity to another.
- Data is vertical.
  - Hence there are no aggregates.

RUNDOWN

MR. FEENY

COVER GIRL

PROPS

HEAD CHEESE

SUBS

OOPS!

LAYER CAKE

ID THEFT

CREATIONISM

GETTIN' SOME

MORE...

Okay, so here’s the model

- RUNDOWN
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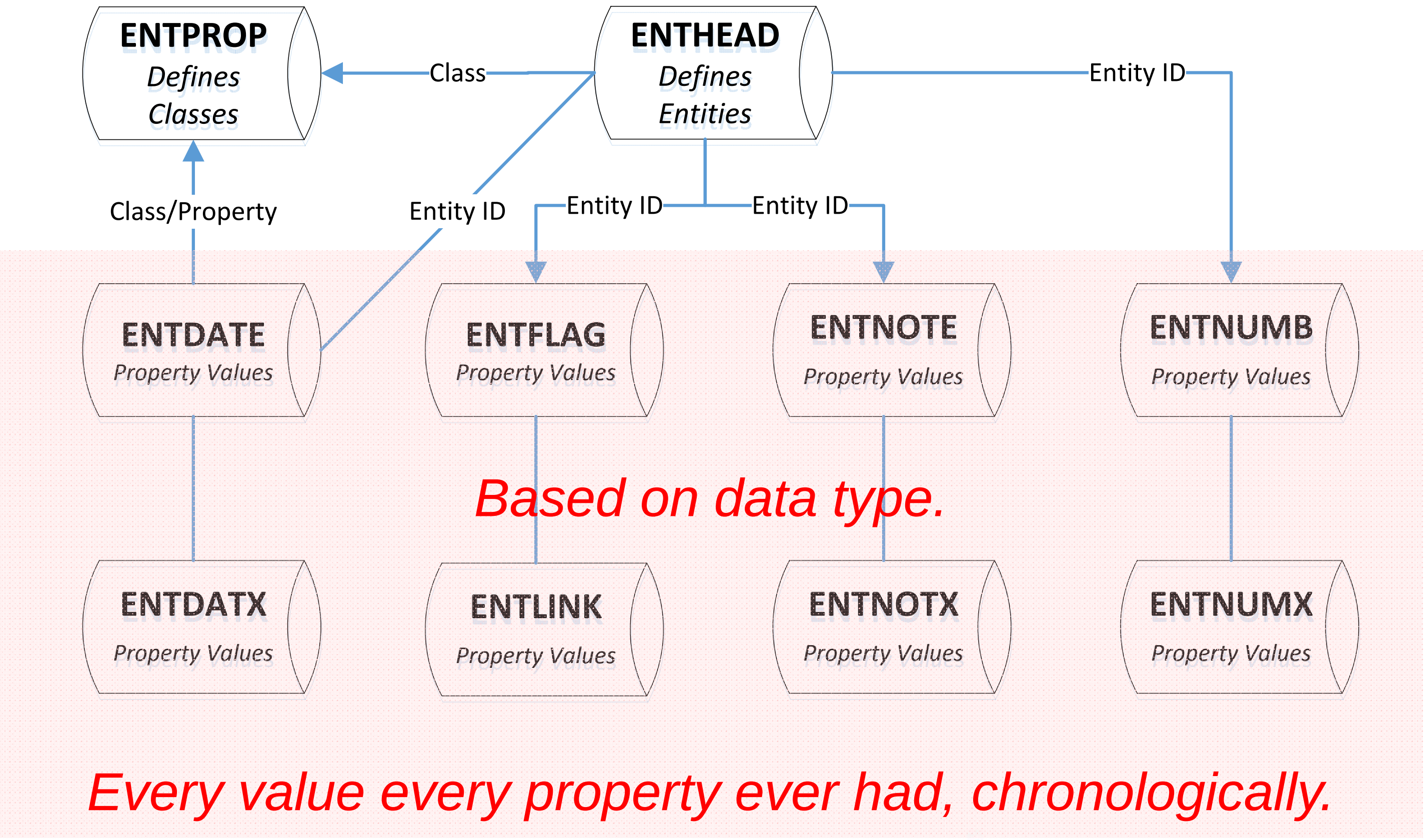
- COVER GIRL
- PROPS
- HEAD CHEESE
- SUBS
- OOPS!
- LAYER CAKE
- ID THEFT
- CREATIONISM
- GETTIN' SOME
- MORE...

No, HERE’s the model



ENTPROP *Defines Classes*

ENTHEAD *Defines Entities*

Class

Entity ID

Class/Property

Entity ID

Entity ID

Entity ID

ENTDATE *Property Values*

ENTFLAG *Property Values*

ENTNOTE *Property Values*

ENTNUMB *Property Values*

Based on data type.

ENTDATX *Property Values*

ENTLINK *Property Values*

ENTNOTX *Property Values*

ENTNUMX *Property Values*

Every value every property ever had, chronologically.

Your entire data set in 10 tables.

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ENTPROP layout

Table ENTPROP – Entity Properties

Contains one row for each Class (to provide a description), plus one row for each Property defined to each Class. GET and PUT functions use this table to verify Class and Property names prior to performing any I/O operations.

Column	**Type**	**Description**
Class	nickname	The name of the class (business object type).
Property	nickname	The name of the Property. Blank if simply describing the Class.
DataType	nickname	The data type for this Property. This will correspond with the LEGACYA value of a pre-installed entity of class DATATYPE.
Descriptor	note	Freeform description of the Property (or Class if the Property is blank).
Sequencer	smallint	The value used to specify the order in which properties for this Class are presented by user interfaces.
PartnerClass	nickname	Optional. For a Class definition (Property is blank), specifies the required class of the Parent ID when instantiating an Entity of that Class. For a Property of type Link, specifies the required class for any value assigned to that Property.
Primary key	**Class, Property, Sequencer**	

OO programmers design classes with source code. Inuendo does it with data.

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ENTPROP examples

Class	Property	Data Type	Descriptor	Seq.
SALESREP			Sales Representative	
SALESREP	CERTIFIED	FLAG	Achieved IBM Sales Certification	120
SALESREP	COMMISSION	NUMB	Commission Percentage	140
SALESREP	PERDIEM	NUMB	Per Diem Rate	160
SALESREP	VEHICLE	LINK	Assigned Company Vehicle	180

Assumption:

- A VEHICLE class exists, with an ENTHEAD record for every company vehicle.

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ENTHEAD layout

Table ENTHEAD – Entity Header

Contains one row for each Entity (instance of a Class). Once created, a row maybe updated but not deleted. The row is comprised of identification and metadata.

Column	Type	Description
EntityID	entityID	Database wide unique identifier (auto generated).
ParentID	entityID	The parent entity from which this entity was spawned and is subordinate to.
Class	nickname	The class of the entity as defined in ENTPROP.
LegacyA	note	The alpha legacy (well known) identifier of the entity.
LegacyN	legacyN	The numeric legacy (well known) identifier of the entity.
Descriptor	note	Freeform general description of the entity.
Status	flag	Simple flag for enabling/disabling entities or tracking their progression through a typical lifecycle.
CreateTime	timestamp	The system time stamp when the entity was created.
CreateJnam	name	IBM i job name which created the entity.
CreateUser	user	User ID which created the entity.
CreateJnum	Job	IBM i job number which created the entity.
CreateProg	name	IBM i program name which created the entity.
Primary key	**EntityID**	

A legend in the Tech Reference explains the Type column.

ENTHEAD examples

Entity ID	Parent ID	Class	Legacy Alpha	Legacy Numeric	Descriptor	Status
1	1	FOUNDER			Database Founder	
75	1	COMPANY		1	ABC Company	
436	75	ADDRBOOK			Our Little Black Book	
2878	436	ADDRESS			Accounts Receivable Office	
7073	75	SALESREP		505	Jackson, Alex F.	A
48562	75	VEHICLE	1F387R5….		Sales Fleet Minivan	A
90395	75	GPS		9450249		A

Every business object is account for in ENTHEAD. Indexes are provided on the Legacy identifiers and the Descriptor to assist the API functions.

“FounderID” is a global variable with a value of 1.

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Data type subtable layout

Table ENTDATE – Entity Dates (all the others are the same except for the type of the Value column).

Contains one for each historical change in value made to each Property of type DATE for each Class. The row contains time, user and program stamps for audit and time travel purposes.

Column	**Type**	**Description**
EntityID	entityID	Database wide unique identifier. Must exist in ENTHEAD.
Property	nickname	The associative name of the Property. Must be a valid Property nickname for the Class of this EntityID.
ChangeTime	timestamp	The system time stamp when the value was assigned.
ChangeJnam	name	IBM i job name which assigned this value to the property.
ChangeUser	user	User ID which assigned this value to the property.
ChangeJnum	job	IBM i job number which assigned this value to the property.
ChangeProg	name	IBM i program name which assigned this value to the property.
Value	date	The value assigned to the property for this entity.
Primary key	**EntityID, Property, ChangeTime**	

Basically, Inuendo is self-journaled, but you may need to journal it if replicating to a High Availability box.

ENTNUMB examples

Entity ID	Property	Value	Time Stamp	User ID	Program
7073	COMMISSION	5.25	2017-03-01 11:23:55	JOHNSONV	SA250
7073	PERDIEM	25	2017-03-01 11:23:55	JOHNSONV	SA250
7073	COMMISSION	5.5	2017-03-31 16:05:14	WILLIAMSC	SA250
7073	PERDIEM	27.5	2017-03-31 16:05:14	WILLIAMSC	SA250

The subtables record every change to every property for every entity, along with information about the change. This can be a **HUGE** help when troubleshooting**.**

“But isn’t that a lot of data?”
-- Naysayers

“Hold my beer.”
-- DB2 for i

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Oops! While we’re at it……

- “Hey, you’re OOPing data!”
  - Michael Szczepanik, GEMKO Information Group, 2010.
- A funny thing happened on the way to Inuendo:
- Inheritance.
  - Entities automatically inherit non-conflicting properties of their ancestors for GET operations, even though they’re not the same class.
- Encapsulation.
  - Logic to traverse the database is contained in the data itself.
  - Period delimited path of link property names can be used in GET functions to perform multiple hops to a desired Entity or one of its properties.
- Polymorphism.
  - Link properties of a given Class can be used to connect to Entities of multiple classes that share common Property nicknames.
- The building blocks of Object Oriented Programming.
  - Others do it with code. Inuendo does it with data. Just sayin’.
  - Sorry about the tangent. On with the show.

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The API layer

- Identity resolution functions
- Entity creation functions
- Property subtable GET functions
- Metadata GET functions
- Property subtable PUT functions
- Metadata PUT functions
- Statistical/Analytics functions
- Stored Procedures:
  - Entity snapshots
  - Entity groups
  - Audit trail history
- Virtual Methods (more OOP-age!)
- Self-defense mechanisms

Identity resolution….

- The most important function, since we need to know which Entity we're working with.
- getEntityID(ParentID, Class, Legacy ID)
  - Multiple RPG variants for alpha & numeric Legacy ID's
  - Overloaded SQL versions to handle either.
  - Implies an Entity ID as a result, naturally.
- Examples:
  - CompanyID = getEntityID(FounderID : 'COMPANY' : 1);
  - SalesRepID = getEntityID(CompanyID : 'SALESREP' : 505);
  - VehicleID = getEntityID(CompanyID : 'VEHICLE' : '1F387R5….');
- Unsuccessful attempt implies a zero.

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Entity creation……

- Also important, because this is how we will build our data set.
- newEntity(ParentID, Class, Legacy ID, Descriptor)
  - Multiple RPG variants for alpha & numeric Legacy ID’s.
  - Overloaded SQL versions to handle either.
  - Descriptor is optional but recommended.
- Examples:
  - CompanyID = newEntity(FounderID : ‘COMPANY’ : 1 : ‘ABC Company’);
  - SalesRepID = newEntity(CompanyID : ‘SALESREP’ : 505 : ‘Jackson, Alex’);
  - VehicleID = newEntity(CompanyID : ‘VEHICLE’ : ‘1F387R5….’);
- If the ParentID/Class/LegacyID already exists, implies the EntityID already on file.
- Violations of ENTPROP structures spawn an Error entity.
- Also **dupEntity** creates a new entity of the same Class with the same current Property values and optionally new Legacy IDs.
- Ask about the EntityID.

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Property value GET’s…..

- After all, we said “the Piece of Information level”.
- getNumb(EntityID, Property).
  - Implies most recently assigned value of that Property.
  - One for each data type subtable (getFlag, getDate, getNote, etc.).
- Examples:
  - HisCommission = getNumb(SalesRepID : ‘COMMISSION’);
  - HisCarModel = getNote(SalesRepID : ‘VEHICLE.MODEL’);
  - HisGPSBrand = getNote(SalesRepID : ‘VEHICLE.GPS.MFG’);
- Violations of ENTPROP structures spawn an Error entity.
  - Contains info about what went wrong.
  - GET function will imply the default value of the data type (0 for numeric, blank for alpha, *LOVAL for date, etc.
- Special variants for Metadata items.
  - getClass, getLegacyN, getStatus, etc.

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PUTTIN’ OUT
GOODIES
FLUX
IMAGINE
TROUBLE
ASK BOB
INSTALLER
SHOWTIME
HOT FUDGE
THANKS
BOTTOM

Property value PUT’s….

- putNumb(EntityID, Property, NewValue).
  - Adds a row to the associated Property Value subtable with the EntityID, Property nickname, the new Value and all stamps.
  - One for each data type subtable (putFlag, putDate, putNote, etc.).
  - Implies a Boolean based on success: True = successful.
  - Immediately available for GET functions.
- Examples:
  - if putNumb(SalesRepID : ‘COMMISSION’, 6.25);   // or standalone
  -    ErrorText = ‘No error…shockingly it worked.’;
  - endif;
- Violations of ENTPROP structures spawn an Error entity.
  - PUT function will imply a False.
- Special variants for Metadata items.
  - putLegacyN, putStatus, putParentID, etc.

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IMAGINE
TROUBLE
ASK BOB
INSTALLER
ON STAGE
HOT FUDGE
THANKS
BOTTOM

Statistical/Analysis…..

- Entity level aggregates.
  - AVG, MIN, MAX, SUM, COUNT of a specified Property for all children of specified Class.
- Property level aggregates.
  - Operates on a specified Property of a single Entity.
  - Straight average or weighted average over life or a time span.
  - MIN, MAX, SUM, COUNT over life or a time span.
- Examples:
  - AvgFleetYear = EntityAvg(CompanyID : 'VEHICLE' : 'YEAR');
    - Average model year of the company's fleet vehicles.
  - HighestPrice = PropertyMax(ItemID : 'UNITPRICE');
    - Highest the unit price ever was for the specified Item.
- Variants on all such functions to allow timestamp range arguments (open & closed end).
- See the Tech Reference.

Stored procedures…..

- Prepackaged routines that produce result sets to be consumed by RPG or SQL with an RS Locator (i7.1).
- Audit trail based:
  - **Snapshot** shows of all current property values for a specified Entity.
  - **PropertyLife** shows every value ever assigned to a Property for a specified Entity.
  - **EntityLife** shows initial creation plus every value every assigned to any Property for a specified Entity.
- **EntityList** gathers up headers based on wild card or positioning parameters on metadata items.
  - Used by the 5250 based search window.
- Entity Group functions gather up entities of a specified Class with Property values in a specified range.
- Dig in and play!

Virtual methods…..

- How you can add your specific business rules to Inuendo.
- These are SQL user defined functions (written in RPG or SQL) with an EntityID as the lone parameter, and returning a value compatible with one of the Inuendo standard data types.
- Function name can be used in the associated subtable GET function instead of a Property name.
- Inuendo will pass the EntityID to the function and imply the result instead of a database value.
- Example:
  - Earned = getNumb(SalesRepID : 'YTDSALES') * getNumb(SalesRepID : 'COMMISSION') / 100;
  - YTDSALES is a Virtual Method, COMMISSION is a Property.

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Self defense mechanisms...

- Triggers automatically defined during installation to enforce that all database inserts and updates are performed with official Inuendo functions.
  - Includes entity creation, metadata and property values.
- Deletes allowed only by using Inuendo supplied rollback.
  - Or IBM i commitment control rollback.
- Attempted violations logged as Error entities.
  - Includes the who, the when, the how, etc.

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The API layer…now and then

Identity resolution functions	**Time Travel Support**
Entity creation functions	
Property subtable GET functions	
Property subtable PUT functions	
Metadata GET functions	
Metadata PUT functions	
Statistical/Analytics functions	
Stored Procedures: • Entity snapshots • Entity groups • Audit trail history	
Virtual Methods	

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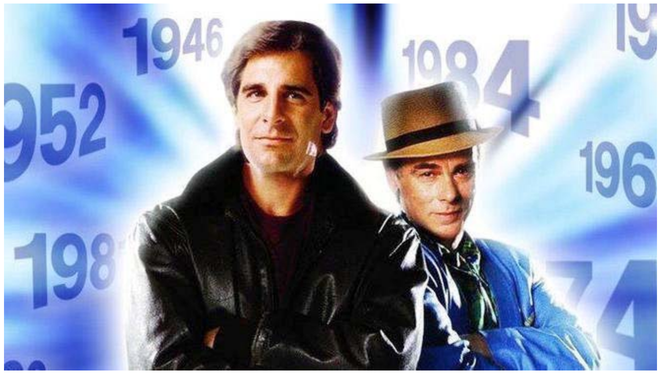
Yes, time travel support !



How the DeLorean works….

- All functions and stored procedures accept an optional Moment parameter.
  - Identity resolution is predicated on whether the Entity existed at the specified Moment.
  - Property GET functions imply the value that was in effect at the specified Moment.
  - Stored Procedures reflect a combination of both the above.
- If Moment not specified, the system time is assumed.
- A Session Moment can be set via *CMD (SETSSNMOM).
  - Takes precedence over the system time.
  - Freezes the session at that Moment until reset (CLRSSNMOM).
  - Prevents any outputs or updates to Inuendo tables.
  - Honored by ALL Inuendo functions & stored procedures.
- We'll see it in action during demo !

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YOUR imagination……..

- Visualizing the hierarchy of your business objects is key.
  - Inuendo has been described as “Sixth Normal Form meets Object Oriented Design and has a virtual baby”.
- Which classes should be connected via ParentID and which should be connected via Link Properties?
- If a POI has a limited set of possibilities, you should consider making it a Class.
- If a collection of POI’s should be consistently structured, you should consider making it a Class.
- Remember, you have only one Legacy identifier per Entity.
  - Otherwise your structure is not optimal.
- You can add Classes and Properties on the fly!
- Strategically consistent naming.
- Live demo.

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Open Sesame…
…uh, Open Saskatchewan

The trouble with opening up

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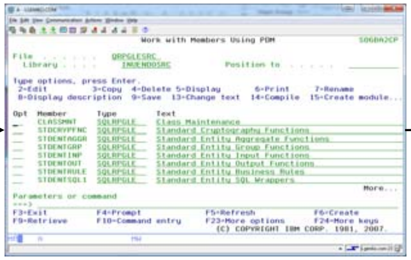
The trouble...

- It’s not so much trouble as it is due process.
- There are many things to consider:
  - Your target user community.
  - Their specific needs.
  - The systems they run.
  - Whether they are potential producers or just consumers.
  - How YOU will continue to evolve your creation.
  - A distribution network.
  - Last but not least, how YOU will benefit from your efforts.
- It’s all in the lifecycle.

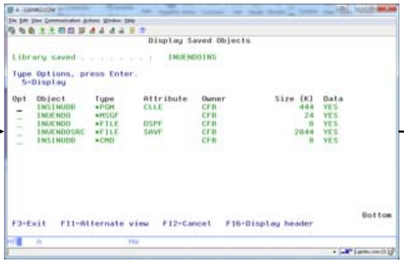
Simplified lifecycle



```
                      Work with Members Using PDM                  S06BA2CP

File  . . . . . .   QRPGLESRC
  Library . . . .     INUENDOSRC          Position to . . . . .  __________

Type options, press Enter.
 2=Edit          3=Copy  4=Delete 5=Display        6=Print     7=Rename
 8=Display description  9=Save  13=Change text  14=Compile  15=Create module...

Opt  Member      Type        Text
 _   CLASSMNT    SQLRPGLE    Class Maintenance
 _   STDCRYPFNC  SQLRPGLE    Standard Cryptography Functions
 _   STDENTAGGR  SQLRPGLE    Standard Entity Aggregate Functions
 _   STDENTGRP   SQLRPGLE    Standard Entity Group Functions
 _   STDENTINP   SQLRPGLE    Standard Entity Input Functions
 _   STDENTOUT   SQLRPGLE    Standard Entity Output Functions
 _   STDENTRULE  SQLRPGLE    Standard Entity Business Rules
 _   STDENTSQL1  SQLRPGLE    Standard Entity SQL Wrappers
                                                                    More...
Parameters or command
===>
F3=Exit          F4=Prompt            F5=Refresh              F6=Create
F9=Retrieve      F10=Command entry    F23=More options        F24=More keys
                                   (C) COPYRIGHT IBM CORP. 1981, 2007.
```

Schmozzle on your development box.

B



```
                        Display Saved Objects

Library saved . . . . . . . . :   INUENDOINS

Type Options, press Enter.
  5=Display

Opt  Object      Type      Attribute   Owner          Size (K)  Data
 _   INSINUDB    *PGM      CLLE        CFB                 444  YES
 _   INUENDO     *MSGF                 CFB                  24  YES
 _   INUENDO     *FILE     DSPF        CFB                   8  YES
 _   INUENDOSRC  *FILE     SAVF        CFB                2044  YES
 _   INSINUDB    *CMD                  CFB                   8  YES

                                                                  Bottom
F3=Exit   F11=Alternate view   F12=Cancel   F16=Display header
```

*SAVF with installer.

github
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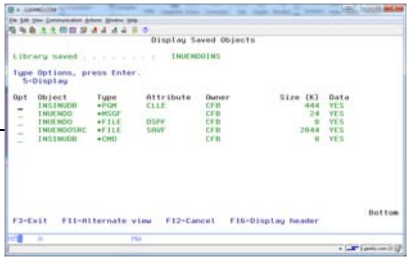
P

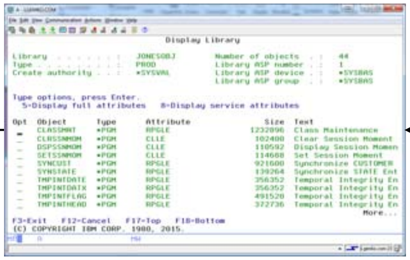
Commit to code repository.



```
                        Display Saved Objects

Library saved . . . . . . . . :   INUENDOINS

Type Options, press Enter.
  5=Display

Opt  Object      Type      Attribute   Owner          Size (K)  Data
 _   INSINUDB    *PGM      CLLE        CFB                 444  YES
 _   INUENDO     *MSGF                 CFB                  24  YES
 _   INUENDO     *FILE     DSPF        CFB                   8  YES
 _   INUENDOSRC  *FILE     SAVF        CFB                2044  YES
 _   INSINUDB    *CMD                  CFB                   8  YES

                                                                  Bottom
F3=Exit   F11=Alternate view   F12=Cancel   F16=Display header
```

*SAVF with installer.

I



```
                           Display Library

Library  . . . . . . :   JONESOBJ      Number of objects  . :   44
Type . . . . . . . . :   PROD          Library ASP number . :   1
Create authority . . :   *SYSVAL       Library ASP device . :   *SYSBAS
                                       Library ASP group  . :   *SYSBAS

Type options, press Enter.
  5=Display full attributes   8=Display service attributes

Opt  Object      Type      Attribute            Size  Text
 _   CLASSMNT    *PGM      RPGLE             1232896  Class Maintenance
 _   CLRSSNMOM   *PGM      CLLE               102400  Clear Session Moment
 _   DSPSSNMOM   *PGM      CLLE               110592  Display Session Momen
 _   SETSSNMOM   *PGM      CLLE               114688  Set Session Moment
 _   SYNCUST     *PGM      RPGLE              921600  Synchronize CUSTOMER
 _   SYNSTATE    *PGM      RPGLE              139264  Synchronize STATE Ent
 _   TMPINTDATE  *PGM      RPGLE              356352  Temporal Integrity En
 _   TMPINTDATX  *PGM      RPGLE              356352  Temporal Integrity En
 _   TMPINTFLAG  *PGM      RPGLE              491520  Temporal Integrity En
 _   TMPINTHEAD  *PGM      RPGLE              372736  Temporal Integrity En
                                                                    More...
F3=Exit   F12=Cancel   F17=Top   F18=Bottom
(C) COPYRIGHT IBM CORP. 1980, 2015.
```

Code & Data libraries.

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Pull request from code repository (user branch).

HF

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"B" is for Build.....

- One of the hardest things you'll ever do.
- Convert source to ASCII stream files in IFS.
  - Recommend folders for each of QCLSRC, QCPYSRC, etc.
  - This supports version control on GitHub or other networks.
  - Upload of source performed via Web page wizard.
- Organize EBCDIC source for target system.
  - Standard file names (QRPGLESRC, QSRVSRC, etc.)
- Create an installer CL (and associated *CMD).
  - Verify release compatibility.
  - Restore all source, compile all objects.
  - Supporting objects (*JOBD, *SRVPGM, *BNDDIR, *MENU, etc.).
  - Set up infrastructure (*SBSD, *JOBQ, *JOBD, *USRPRF, etc.).
  - Perform one-time data initializations.
- Package it all in a *SAVF.

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“I” is for Install....

- Usually requires a RSTLIB or RSTOBJ by the user.
  - Recommend RSTLIB containing *SAVF, *CMD and CPP.
  - *SAVF contains everything the *CMD needs for installation.
  - Yes, that means a *SAVF within a *SAVF.
  - This is how your Build should package it.
  - See INSINUDB command.
- Run the installation command.
  - Recommend *SECOFR authority.
  - Recommend prompt for NEW target library names.
- User signs off, back on and should be ready to roll.
- Perhaps suggest mods to QSTRUPPGM.
  - Hopefully you’ve provided an install guide in PDF. ☺

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"P" is for Promote…..

- GitHub is a great place to host a repository.
  - There are others. BitBucket, SourceForge, BeanStalk, etc.
  - Each has their own little internal social network.
- Twitter used by many IBM i open source enthusiasts.
  - Use #IBMi, #IBMiOSS when posting. Follow #COMMON.
- LinkedIn groups will get some traffic, less than Twitter.
  - "Inuendo – Data's New Direction".
  - "IBM i OSS", "IBM i Professionals".
- If attending COMMON, participate in OSS Round Table.
  - Jesse Gorzinski is IBM's OSS contact for i platform.
  - Aaron Bartell, Liam Allen are among champions.
- Speak at user groups or regional events, like I am. ☺
  - A lot of fun and great networking.

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"HF" is for Have Fun….

- The software world is not dominated by crusty old vendors and lifers anymore.
- Getting involved in the Open Source community can re-energize your career.
  - Encourages and assists with skills building.
  - Inspires creativity.
  - Creates healthy competition in the software space.
  - Watch and Follow active projects and authors.
- Start with IBM i, but consider branching out.
  - Linux, Windows, Apple & Google communities are all rich with open source utilities and opportunities.
- Make going to work fun again.
  - Let continuous improvement become your corporate culture.
  - GEMKO can assist and coach you.

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Thank you for attending !

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Inuendo – Data's New Direction (group)

@InuendoData
#Inuendo #IBMi #IBMiOSS

GitHub

cfburns (profile)
RPTMOD, Inuendo (repositories)

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