Technical Reference

Inuendo 1.2 (Alpha release) – TECHNICAL REFERENCE

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1. Preface

Inuendo, in short, is the virtualization of data. Traditionally, data has been imprisoned in physical tables with fixed record layouts. The limitations of such structure have inhibited developers and the users they support, for decades. By virtualizing the data instead, the majority of these limitations are eliminated, resulting in simpler development, maintenance and troubleshooting of applications.

Inuendo treats all business objects (a.k.a. Entities) the same, regardless of their role in the supply chain. This allows entities of lesser obvious importance to produce equally valuable business intelligence.

The blueprint of any Inuendo entity is a class definition comprised of properties – a concept similar to object oriented design. Each property conforms to a specified data type. When an entity is instantiated (created), its unique identity and high priority metadata are stored in a header record. The values of its properties are stored in an associative manner (by nickname) in a series of subtables – one table per data type. As the values of properties change over time, each change is recorded chronologically in the subtables, providing a time indexed history at the property level. This is extremely useful in troubleshooting and trend analysis. In addition, the scattering of data in this fashion provides a layer of security not possible with traditional linear record formats.

As its name and logo suggests, Inuendo begins and ends with I/O (input/output). Therefore, in order to provide applications a simple and consistent way to extract and manipulate its scattered data, it is accompanied by a wealth of open source API's to perform tasks such as entity creation and property value assignment. Various stored procedures produce result sets with useful collections of data organized from the header and subtables.

Despite the fact that Inuendo is being deployed in live applications, it is still a work in progress. Please consider joining our grass roots effort to virtualize data by becoming a member of our LinkedIn group and contributing your technical expertise to help us improve the functionality of Inuendo.

2. What's new?

Encrypted Date type (DATX)

Due to the sensitivity of Date of Birth and other dates, when it comes to identity protection, a new data type (DATX) has been added to the portfolio. It is accompanied by functions **getDatX**, **getDatXn**, **getDatXa** and **putDatX**. These values are actually stored as 40 character encrypted strings on disk.

Expansion of Number data type (NUMB)

In order to provide increased precision for latitudes and longitudes, the NUMB data type has been enlarged by two decimal positions, for a total length of 25, including 7 decimals.

Error Entities

All Inuendo PUT functions as well as the newEntity function will now capture information regarding failed output attempts in entities of new preloaded classes CLASSERROR and PROPERROR. This feature will likely expand in future releases.

- PUT functions will continue to imply a True value if they are successful. When unsuccessful, they will still imply a False value, but also create an associated PROPERROR entity containing information about the error.

- A successful newEntity function will continue to imply the new unique ID of the entity just created. When unsuccessful, it will imply a zero value and create a CLASSERROR entity containing information about the error.

- A new generic Error Report is available on the Inuendo main menu. The user is prompted for a Moment range and an optional User ID.

Partner Classes

One of the basic design principles of Inuendo is that all entities contain a Parent ID. In addition, some entities also have Link properties whose values represent the unique ID's of other entities. However, there has never been any governance regarding the class associated with these partner entities. This has been addressed by adding a Partner Class column to ENTPROP and adding a prompt for this value in Class Maintenance.

- When defining a Class header, you may now specify an optional Partner Class to indicate the required Class of the Parent ID when instantiating an Entity with the **newEntity** function.

- When defining a Link property, you may now specify an optional Partner Class to indicate the required Class of any EntityID assigned as the value argument of a **putLink** function on that property.

- If a Partner Class rule is violated in either case, the operation will fail and spawn an associated Error entity.

Entity Groups

A series of standardized stored procedures have been added to produce result sets of Entity Headers of a specified Class that are subordinate to a specified Parent entity, and which have a specified property value (either an exact match or within a range). This is intended to be a launching point for inquiry or reporting operations and eliminates the need to define SQL cursors for these tasks in application code. All time travel options are supported.

3. Data Types Legend

DATA TYPES LEGEND		
Inuendo type	**Native type**	**Primary uses**
entityID	Bigint	Unique ID or Parent ID in ENTHEAD. Entity ID in all data type subtables.
Datx (encrypted date)	Varchar(40)	VALUE column in subtable ENTDATX.
flag	Char(1)	VALUE column in subtable ENTFLAG. STATUS column in ENTHEAD.
job	Char(6)	CREATEJNUM column in ENTHEAD. CHANGEJNUM column in all data type subtables.
legacyN	Bigint	LEGACYN column in ENTHEAD.
link (same as entityID)	Bigint	VALUE column in subtable ENTLINK.
name	Char(10)	CREATEJNAM column in ENTHEAD. CHANGEJNAM column in all data type subtables.
nickname	Varchar(14)	CLASS column in ENTHEAD. PROPERTY column in all data type subtables.
note	Varchar(254)	VALUE column in subtable ENTNOTE. DESCRIPTOR column in ENTHEAD. Period delimited property path used in GET functions.
notx (encrypted note)	Varchar(510)	VALUE column in subtable ENTNOTX.
number	Decimal(25,7)	VALUE column in subtable ENTNUMB.
numx (encrypted number)	Varchar(62)	VALUE column in subtable ENTNUMX.
user	Char(18)	CHANGEUSER column in all data type subtables. CREATEUSER column in ENTHEAD.

4. Table structures

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	
Indexes	ENTHEADL1 (ParentID, Class, LegacyA, LegacyN) ENTHEADL2 (ParentID, Class, LegacyN) ENTHEADL3 (Class, LegacyA, LegacyN, EntityID) ENTHEADL4 (Class, LegacyN, EntityID)	

Table structures (cont.)

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 general 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	
Indexes	ENTPROPL1 (Class, Sequencer)	

Table structures (cont.)

Table **ENTDATE** – Entity Dates

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	

Table **ENTFLAG** – Entity Flags

Contains one for each historical change in value made to each Property of type FLAG 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	*flag*	The value assigned to the property for this entity.
Primary key	EntityID, Property, ChangeTime	

Table structures (cont.)

Table **ENTLINK** – Entity Links

Contains one for each historical change in value made to each Property of type LINK 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	*entityID*	The value assigned to the property for this entity. Must exist in ENTHEAD.
Primary key	EntityID, Property, ChangeTime	

Table **ENTNOTE** – Entity Notes

Contains one for each historical change in value made to each Property of type NOTE 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	*note*	The value assigned to the property for this entity.
Primary key	EntityID, Property, ChangeTime	

Table structures (cont.)

Table **ENTNOTX** – Entity Notes (encrypted)

Contains one for each historical change in value made to each Property of type NOTX 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	*notx*	The value assigned to the property for this entity, in encrypted form.
Primary key	EntityID, Property, ChangeTime	

Table **ENTNUMB** – Entity Numbers

Contains one for each historical change in value made to each Property of type NUMB 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	*number*	The value assigned to the property for this entity.
Primary key	EntityID, Property, ChangeTime	

Table **ENTNUMX** – Entity Numbers (encrypted)

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

Encrypted numbers are stored on disk in a binary character format, but implied in a numeric form when retrieved from disk using the associated GET function.

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	*Numx*	The value assigned to the property for this entity, in encrypted form.
Primary key	EntityID, Property, ChangeTime	

Table **ENTDATX** – Entity Dates (encrypted)

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

Encrypted dates are stored on disk in a binary character format, but implied in a date form when retrieved from disk using the associated GET function.

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	*datx*	The value assigned to the property for this entity, in encrypted form.
Primary key	EntityID, Property, ChangeTime	

5. APPLICATION PROGRAM INTERFACES

- **Identity resolution functions**
- **Entity creation functions**
- **Subtable GET functions**
- **Subtable PUT functions**
- **Metadata GET functions**
- **Metadata PUT functions**
- **Miscellaneous functions**
- **Time Travel functions**
- **Statistical functions**
- **Audit trail procedures**
- **Entity Group procedures**

NOTE: Functions or procedures that accept an optional Moment argument will assume the current system time stamp if the argument is not specified. However, if a Session Moment is in effect, that value will be used instead of the current system time stamp when an optional Moment argument is not provided.

Identity resolution functions

These functions positively identify an entity based on its class, parent entity and legacy identifiers.

Function **getEntityID** – returns *entityID*	
getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*, **LegacyA** *note*, **Moment** *timestamp*) getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*, **LegacyA** *note*) getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*, **Moment** *timestamp*) getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*) getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyA** *note*, **Moment** *timestamp*) getEntityID(**ParentID** *entityID*, **Class** *nickname*, **LegacyA** *note*)	
Returns the unique ID of the entity of the specified **Class**, subordinate to the **ParentID** and having the specified numeric (**LegacyN**) or alpha legacy (**LegacyA**) identifiers, or a combination of both. The entity must have existed at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Under normal circumstances, an entity will have either a numeric or an alpha legacy ID, but not both.	
Exports for RPG	STDENTINP(GETENTITYID) STDENTINP(GETENTITYIDN) STDENTINP(GETENTITYIDA)
Exports for SQL	STDENTSQL1(GETENTITYID5) STDENTSQL1(GETENTITYID4) STDENTSQL1(GETENTITYIDN4) STDENTSQL1(GETENTITYIDN3) STDENTSQL1(GETENTITYIDA4) STDENTSQL1(GETENTITYIDA3)

Entity creation functions

These functions instantiate new entities for a specified Class, subordinate to a Parent entity, and optionally having a legacy identifier in either numeric or alpha format.

Function **newEntity** – returns *entityID*
newEntity(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*, **LegacyA** *note,* **Descriptor** *note*) newEntity(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*, **Descriptor** *note*) newEntity(**ParentID** *entityID*, **Class** *nickname*, **LegacyN** *bigint*) newEntity(**ParentID** *entityID*, **Class** *nickname*, **LegacyA** *note,* **Descriptor** *note*) newEntity(**ParentID** *entityID*, **Class** *nickname*, **LegacyA** *note*)
Creates a new entity of type **Class** in the ENTHEAD table. The new entity is subordinate to the **ParentID** and contains the legacy identifiers (**LegacyN**, **LegacyA**). Typically only one of the legacy identifiers contains a value. If a **Descriptor** is specified, it is applied to the ENTHEAD record as well. The new entity is also time, user and program stamped for audit and time travel purposes. In parallel, the arguments provided (metadata) are also written to designated data type subtables for audit and time travel purposes. Returns the unique ID of the new entity. See the **Metadata Put Functions** section for details on these parallel entries.

Exports for RPG	STDENTOUT(NEWENTITY) STDENTOUT(NEWENTITYN) STDENTOUT(NEWENTITYA)
Exports for SQL	STDENTSQL2(NEWENTITYB5) STDENTSQL2(NEWENTITYN4) STDENTSQL2(NEWENTITYN3) STDENTSQL2(NEWENTITYA4) STDENTSQL2(NEWENTITYA3)

Entity creation functions (cont.)

Function **dupEntity** – returns *entityID*	
dupEntity(**FromID** *entityID*, **LegacyN** *bigint*, **LegacyA** *note,* **Descriptor** *note*) dupEntity(**FromID** *entityID*, **LegacyN** *bigint*, **Descriptor** *note*) dupEntity(**FromID** *entityID*, **LegacyN** *bigint*) dupEntity(**FromID** *entityID*, **LegacyA** *note,* **Descriptor** *note*) dupEntity(**FromID** *entityID*, **LegacyA** *note*)	
Creates a new entity of the same class as **FromID**, with all properties set to an initial value matching the corresponding current values in **FromID**. Legacy identifiers **LegacyN** (numeric) and/or **LegacyA** (alpha) may be specified and will be placed in the corresponding columns of the new ENTHEAD record. An optional **Descriptor** may be provided for the new entity.	
Exports for RPG	STDENTOUT(DUPENTITY) STDENTOUT(DUPENTITYND) STDENTOUT(DUPENTITYN) STDENTOUT(DUPENTITYAD) STDENTOUT(DUPENTITYA)
Exports for SQL	STDENTOUT(DUPENTITY) STDENTOUT(DUPENTITYND) STDENTOUT(DUPENTITYN) STDENTOUT(DUPENTITYAD) STDENTOUT(DUPENTITYA)

Function **copyEntity** – returns *entityID*	
copyEntity(**FromID** *entityID*, **ParentID** *entityid*)	
Creates a new entity of the same class as **FromID**, subordinate to the specified **ParentID**, with all properties set to an initial value matching the corresponding current values in **FromID**. The remainder of the metadata (legacy identifiers, class and status) is copied verbatim to the new Entity header. Returns the unique ID of the new Entity.	
Exports for RPG	STDENTOUT(COPYENTITY)
Exports for SQL	STDENTOUT(COPYENTITY)

Subtable GET functions

These functions retrieve values from the data type subtables for the specified EntityID and Property nickname that was in effect at a specified Moment in time.

Function **getDate** – returns *date*	
getDate(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getDate(**EntityID** *entityID*, **Property** *note*)	
Returns the VALUE column from subtable ENTDATE for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Property may be one of the following: • A valid nickname for a *date* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *date* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETDATE)
Exports for SQL	STDENTSQL1(GETDATE3) STDENTSQL1(GETDATE2)

Function **getDateN** – returns *numeric(8)*	
getDateN(**EntityID** *entityID*, **Property** *note*, **DateFormat** *char(5)*, **Moment** *timestamp*) getDateN(**EntityID** *entityID*, **Property** *note,* **DateFormat** *char(5)*)	
Returns the numeric cast of the VALUE column from subtable ENTDATE for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. **DateFormat** is one of the valid IBM date formats, and represents the format of the return value.	
Property may be one of the following: • A valid nickname for a *date* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *date* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETDATEN)
Exports for SQL	STDENTSQL1(GETDATEN4) STDENTSQL1(GETDATEN3)

Subtable GET functions (cont.)

Function **getDateA** – returns *char(10)*
getDateA(**EntityID** *entityID*, **Property** *note*, **DateFormat** *char(5)*, **Moment** *timestamp*) getDateA(**EntityID** *entityID*, **Property** *note,* **DateFormat** *char(5)*)
Returns the character cast of the VALUE column from subtable ENTDATE for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. **DateFormat** is one of the valid IBM date formats with an optional delimiter character, and represents the format of the return value.
Property may be one of the following: • A valid nickname for a *date* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *date* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETDATEA)
Exports for SQL	STDENTSQL1(GETDATEA4) STDENTSQL1(GETDATEA3)

Function **getFlag** – returns *flag*
getFlag(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getFlag(**EntityID** *entityID*, **Property** *note*)
Returns the VALUE column from subtable ENTFLAG for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.
Property may be one of the following: • A valid nickname for a *flag* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *flag* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETFLAG)
Exports for SQL	STDENTSQL1(GETFLAG3) STDENTSQL1(GETFLAG2)

Subtable GET functions (cont.)

Function **getLink** – returns *link*	
getLink(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getLink(**EntityID** *entityID*, **Property** *note*)	
Returns the VALUE column from subtable ENTLINK for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Property may be one of the following: • A valid nickname for a *link* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *link* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETLINK)
Exports for SQL	STDENTSQL1(GETLINK3) STDENTSQL1(GETLINK2)

Function **getNote** – returns *note*	
getNote(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getNote(**EntityID** *entityID*, **Property** *note*)	
Returns the VALUE column from subtable ENTNOTE for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Property may be one of the following: • A valid nickname for a *note* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *note* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETNOTE)
Exports for SQL	STDENTSQL1(GETNOTE3) STDENTSQL1(GETNOTE2)

Subtable GET functions (cont.)

Function **getNotX** – returns *note (w/decryption)*
getNotX(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getNotX(**EntityID** *entityID*, **Property** *note*)
Returns the VALUE column from subtable ENTNOTX for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. The value is automatically decrypted.
Property may be one of the following: • A valid nickname for a *note* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *note* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETNOTE)
Exports for SQL	STDENTSQL1(GETNOTX3) STDENTSQL1(GETNOTX2)

Function **getNumb** – returns *number*
getNumb(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getNumb(**EntityID** *entityID*, **Property** *note*)
Returns the VALUE column from subtable ENTNUMB for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.
Property may be one of the following: • A valid nickname for a *number* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *number* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETNUMB)
Exports for SQL	STDENTSQL1(GETNUMB) STDENTSQL1(GETNUMB)

Function **getNumX** – returns *number (w/decryption)*	
getNumX(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getNumX(**EntityID** *entityID*, **Property** *note*)	
Returns the VALUE column from subtable ENTNUMX for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. The value is automatically decrypted and converted to numeric format.	
Property may be one of the following: • A valid nickname for a *note* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *note* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETNUMX)
Exports for SQL	STDENTSQL1(GETNUMX3) STDENTSQL1(GETNUMX2)

Function **getDatX** – returns *date (w/decryption)*	
getDatX(**EntityID** *entityID*, **Property** *note*, **Moment** *timestamp*) getDatX(**EntityID** *entityID*, **Property** *note*)	
Returns the VALUE column from subtable ENTDATX for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. The value is automatically decrypted and converted to date format.	
Property may be one of the following: • A valid nickname for a *note* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *note* type property associated with the class of the rightmost link property in the cascading path.	
Exports for RPG	STDENTINP(GETDATX)
Exports for SQL	STDENTSQL1(GETDATX3) STDENTSQL1(GETDATX2)

Function **getDatxN** – returns *numeric(8)*
getDatxN(**EntityID** *entityID*, **Property** *note*, **DateFormat** *char(5)*, **Moment** *timestamp*) getDatxN(**EntityID** *entityID*, **Property** *note,* **DateFormat** *char(5)*)
Returns the numeric cast of the VALUE column from subtable ENTDATX for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. **DateFormat** is one of the valid IBM date formats, and represents the format of the return value. The value is automatically decrypted and converted to numeric format.
Property may be one of the following: • A valid nickname for a *date* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *date* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETDATXN)
Exports for SQL	STDENTSQL1(GETDATXN4) STDENTSQL1(GETDATXN3)

Function **getDatxA** – returns *char(10)*
getDatxA(**EntityID** *entityID*, **Property** *note*, **DateFormat** *char(5)*, **Moment** *timestamp*) getDatxA(**EntityID** *entityID*, **Property** *note,* **DateFormat** *char(5)*)
Returns the character cast of the VALUE column from subtable ENTDATX for the combination of **EntityID** and **Property** that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed. **DateFormat** is one of the valid IBM date formats with an optional delimiter character, and represents the format of the return value. The value is automatically decrypted and converted to character.
Property may be one of the following: • A valid nickname for a *date* type property associated with the class of the **EntityID.** • A period delimited path of cascading link property nicknames followed by a valid nickname for a *date* type property associated with the class of the rightmost link property in the cascading path.

Exports for RPG	STDENTINP(GETDATXA)
Exports for SQL	STDENTSQL1(GETDATXA4) STDENTSQL1(GETDATXA3)

Subtable PUT functions

These functions append the specified data type subtable with a new value entry for the specified EntityID and Property combination. The entry is time, user and program stamped for audit and time travel purposes.

Function **putDate** – returns *boolean*	
putDate(**EntityID** *entityID*, **Property** *note*, **NewValue** *date*)	
Appends the ENTDATE subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTDATE, but the operation is still considered successful.	
Property must be a valid nickname for a *date* type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTDATE)
Exports for SQL	STDENTOUT(PUTDATE)

Function **putFlag** – returns *boolean*	
putFlag(**EntityID** *entityID*, **Property** *note*, **NewValue** *flag*)	
Appends the ENTFLAG subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTFLAG, but the operation is still considered successful.	
Property must be a valid nickname for a *flag* type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTFLAG)
Exports for SQL	STDENTOUT(PUTFLAG)

Subtable PUT functions (cont.)

Function **putLink** – returns *boolean*	
putLink(**EntityID** *entityID*, **Property** *note*, **NewValue** *entityID*)	
Appends the ENTLINK subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTLINK, but the operation is still considered successful.	
Property must be a valid nickname for a *link* type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTLINK)
Exports for SQL	STDENTOUT(PUTLINK)

Function **putNote** – returns *boolean*	
putNote(**EntityID** *entityID*, **Property** *note*, **NewValue** *note*)	
Appends the ENTNOTE subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTNOTE, but the operation is still considered successful.	
Property must be a valid nickname for a *note* type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTNOTE)
Exports for SQL	STDENTOUT(PUTNOTE)

Subtable PUT functions (cont.)

Function **putNotX** – returns *boolean*	
putNotX(**EntityID** *entityID*, **Property** *note*, **NewValue** *note*)	
Appends the ENTNOTX subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. The value is automatically encrypted. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTNOTX, but the operation is still considered successful.	
Property must be a valid nickname for a ***notx*** type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTNOTX)
Exports for SQL	STDENTOUT(PUTNOTX)

Function **putNumb** – returns *boolean*	
putNumb(**EntityID** *entityID*, **Property** *note*, **NewValue** *number*)	
Appends the ENTNUMB subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTNUMB, but the operation is still considered successful.	
Property must be a valid nickname for a ***numb*** type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTNUMB)
Exports for SQL	STDENTOUT(PUTNUMB)

Function **putNumX** – returns *boolean*	
putNumX(**EntityID** *entityID*, **Property** *note*, **NewValue** *number*)	
Appends the ENTNUMX subtable with a time indexed entry for the specified **EntityID** and **Property**, reflecting the **NewValue**. The value is automatically encrypted. Returns a true or false value indicating whether the operation was successful. If the **NewValue** matches the current value, no entry is written to ENTNUMX, but the operation is still considered successful.	
Property must be a valid nickname for a ***numx*** type property associated with the class of the **EntityID.**	
Exports for RPG	STDENTOUT(PUTNUMX)
Exports for SQL	STDENTOUT(PUTNUMX)

Metadata GET functions

These functions return current values from the ENTHEAD table for specified EntityID.

Function **getParentID** – returns *entityID*	
getParentID(**EntityID** *entityID)*	
Returns the **current** value of the PARENTID column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getLink** function with property nickname **PARENTID** instead.	
Exports for RPG	STDENTINP(GETPARENTID)
Exports for SQL	STDENTSQL1(GETPARENTID)

Function **getClass** – returns *nickname*	
getClass(**EntityID** *entityID)*	
Returns the **current** value of the CLASS column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getNote** function with property nickname **CLASS** instead.	
Exports for RPG	STDENTINP(GETCLASS)
Exports for SQL	STDENTSQL1(GETCLASS)

Function **getDescriptor** – returns *note*	
getDescriptor(**EntityID** *entityID)*	
Returns the **current** value of the DESCRIPTOR column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getNote** function with property nickname **DESCRIPTOR** instead.	
Exports for RPG	STDENTINP(GETDESCRIPTOR)
Exports for SQL	STDENTSQL1(GETDESCRIPTOR)

Metadata GET functions (cont.)

Function **getLegacyA** – returns *note*	
getLegacyA(**EntityID** *entityID)*	
Returns the **current** value of the LEGACYA column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getNote** function with property nickname **LEGACYA** instead.	
Exports for RPG	STDENTINP(GETLEGACYA)
Exports for SQL	STDENTSQL1(GETLEGACYA)

Function **getLegacyN** – returns *bigint*	
getLegacyN(**EntityID** *entityID)*	
Returns the **current** value of the LEGACYN column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getNumb** function with property nickname **LEGACYN** instead.	
Exports for RPG	STDENTINP(GETLEGACYA)
Exports for SQL	STDENTSQL1(GETLEGACYA)

Function **getStatus** – returns *flag*	
getStatus(**EntityID** *entityID)*	
Returns the **current** value of the STATUS column from ENTHEAD for the specified **EntityID.** If a moment specific value is required, use the **getFlag** function with property nickname **STATUS** instead.	
Exports for RPG	STDENTINP(GETSTATUS)
Exports for SQL	STDENTSQL1(GETSTATUS)

Metadata PUT functions

These functions update the current values in the ENTHEAD table for specified EntityID. To provide an audit trial, each function also creates a parallel entry in a designated data type subtable.

Function **putParentID** – returns *boolean*	
putParentID(**EntityID** *entityID,* **NewParentID** *entityID)*	
Replaces the **current** value of the PARENTID column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTLINK subtable using the property nickname PARENTID. Returns a true or false value indicating whether the operation was successful.	
Exports for RPG	STDENTOUT(PUTPARENTID)
Exports for SQL	STDENTOUT(PUTPARENTID)

Function **putClass** – returns *Boolean*	
putParentID(**EntityID** *entityID,* **NewClass** *nickname)*	
Replaces the **current** value of the CLASS column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTNOTE subtable using the property nickname CLASS. Returns a true or false value indicating whether the operation was successful. Use with caution, because a change in CLASS could invalidate existing entries in the subtables if their property nicknames are not valid for the new CLASS.	
Exports for RPG	STDENTOUT(PUTCLASS)
Exports for SQL	STDENTOUT(PUTCLASS)

Metadata PUT functions (cont.)

Function **putDescriptor** – returns *Boolean*	
putDescriptor(**EntityID** *entityID,* **NewDescriptor** *note)*	
Replaces the **current** value of the DESCRIPTOR column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTNOTE subtable using the property nickname DESCRIPTOR. Returns a true or false value indicating whether the operation was successful.	
Exports for RPG	STDENTOUT(PUTDESCRIPTOR)
Exports for SQL	STDENTOUT(PUTDESCRIPTOR)

Function **putLegacyN** – returns *Boolean*	
putLegacyN(**EntityID** *entityID,* **NewLegacyN** *bigint)*	
Replaces the **current** value of the LEGACYN column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTNUMB subtable using the property nickname LEGACYN. Returns a true or false value indicating whether the operation was successful.	
Exports for RPG	STDENTOUT(PUTLEGACYN)
Exports for SQL	STDENTOUT(PUTLEGACYN)

Metadata PUT functions (cont.)

Function **putLegacyA** – returns *Boolean*	
putLegacyA(**EntityID** *entityID,* **NewLegacyA** *note)*	
Replaces the **current** value of the LEGACYA column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTNOTE subtable using the property nickname LEGACYA. Returns a true or false value indicating whether the operation was successful.	
Exports for RPG	STDENTOUT(PUTLEGACYA)
Exports for SQL	STDENTOUT(PUTLEGACYA)

Function **putStatus** – returns *Boolean*	
putLegacyA(**EntityID** *entityID,* **NewStatus** *flag)*	
Replaces the **current** value of the STATUS column in ENTHEAD for the specified **EntityID.** In addition, unless this has been called by the RollBackJob function, an entry is written to the ENTFLAG subtable using the property nickname STATUS. Returns a true or false value indicating whether the operation was successful.	
Exports for RPG	STDENTOUT(PUTSTATUS)
Exports for SQL	STDENTOUT(PUTSTATUS)

Miscellaneous functions

These functions, while public, were created primarily for the purpose of enforcing integrity rules within the GET and PUT functions.

Function **ValidProperty** – returns *boolean*	
ValidProperty(**EntityID** *entityID,* **Property** *nickname,* **DataType** *nickname)* ValidProperty(**EntityID** *entityID,* **Property** *nickname)*	
Verifies that the specified **Property** nickname is valid for the class of the **EntityID**. If **DataType** is specified, the nickname must also be defined as that type. Returns a true or false value indicating whether the property nickname is valid.	
Exports for RPG	STDENTINP(VALIDPROPERTY)
Exports for SQL	STDENTSQL2(VALIDPROPERTY3) STDENTSQL2(VALIDPROPERTY2)

Function **ValidClassProperty** – returns *boolean*	
ValidClassProperty(**Class** *nickname,* **Property** *nickname,* **DataType** *nickname)* ValidClassProperty(**Class** *nickname,* **Property** *nickname)*	
Verifies that the specified **Property** nickname is valid for the specified **Class**. If **DataType** is specified, the nickname must also be defined as that data type. Returns a true or false value indicating whether the property nickname is valid.	
Exports for RPG	STDENTINP(VALIDCLASSPROPERTY)
Exports for SQL	STDENTSQL2(VALIDCLASSPROPERTY3) STDENTSQL2(VALIDCLASSPROPERTY2)

Function **PropertyOwner** – returns *entityID*	
PropertyOwner(**EntityID** *entityID,* **Property** *note)*	
Determines the unique ID of the entity actually used by GET functions to retrieve the value of the **Property** for the specified **EntityID**. This function takes into account any inheritance of properties from ancestor entities. The **Property** nickname may be prefixed by a period delimited path of link type property nicknames. Returns the actual entity ID of the ultimate property owner.	
Exports for RPG	STDENTINP(PROPERTYOWNER)
Exports for SQL	STDENTINP(PROPERTYOWNER)

Miscellaneous functions (cont.)

Function **Ancestor** – returns *entityID*	
Ancestor(**Descendant** *entityID,* **Class** *nickname)*	
Determines the unique ID of the entity of type **Class** that is a direct ancestor of the specified **Descendant**. The function travels upward in the ENTHEAD table using the ParentID at each level until it finds an entity with a matching **Class**. Returns the actual entity ID of that ancestor, or 0 if none is found.	
Exports for RPG	STDENTRULE(ANCESTOR)
Exports for SQL	STDENTRULE(ANCESTOR)

Function **HasChildren** – returns *Boolean*	
HasChildren(**EntityID** *entityID)*	
Determines whether any entities exist in ENTHEAD with a ParentID equal to the specified **EntityID**. Returns a true or false value indicating whether or not child entities were found. This function does NOT take into account matching values in the ENTLINK table.	
Exports for RPG	STDENTRULE(ANCESTOR)
Exports for SQL	STDENTRULE(ANCESTOR)

Function **ValidClass** – returns *boolean*	
ValidClass(**Class** *nickname)*	
Verifies that the specified **Class** nickname has been defined in the ENTPROP table. Returns a true or false value indicating whether the class nickname is valid.	
Exports for RPG	STDENTINP(VALIDCLASS)
Exports for SQL	None

Miscellaneous functions (cont.)

Function **FinalSegment** – returns *nickname*	
FinalSegment(**FullPath** *note)*	
Returns the final Property nickname in a period delimited property path. Used by the subtable GET functions to determine which Property value to retrieve from the actual Entity implied by the path.	
Exports for RPG	STDENTINP(FINALSEGMENT)
Exports for SQL	None

Procedure **SearchEntity**	
SearchEntity(**ParentID** *entityID,* **Class** *nickname,* **PreviousID** *entityID)* SearchEntity(**ParentID** *entityID,* **Class** *nickname)*	
For 5250 based applications, displays a pop-up window in which the user may select from a list of entities of the specified **Class** that are subordinate to the specified **ParentID**. The unique ID of the selected Entity is returned. If a **PreviousID** is specified and the user exits the window without making a selection, the **PreviousID** is returned.	
Exports for RPG	STDENTRULE(SEARCHENTITY)
Exports for SQL	None

Miscellaneous functions (cont.)

Function **DeleteEntity** – returns *boolean*	
DeleteEntity(**EntityID** *entityID*, **Cascading** *flag*) DeleteEntity(**EntityID** *entityID*)	
Deletes any subtable entries associated with the specified **EntityID**, then deletes as the header record in ENTHEAD. Also deletes any entries in the ENTLINK table whose value equals the **EntityID**. If dependent entities exist, the **Cascading** flag must be "Y", otherwise the function will terminate without any deletions and return a FALSE value. If **Cascading** = "Y", any dependent child entities, regardless of how many levels, are deleted as well. Returns a TRUE value if the header is successfully deleted. Note that referential constraints prohibit a header from being deleted if associated subtable entries or child entities exist. If **Cascading** is not specified, a value of "N" is assumed.	
Exports for RPG	STDENTUTIL(DELETEENTITY)
Exports for SQL	STDENTUTIL(DELETEENTITY2) STDENTUTIL(DELETEENTITY1)

Function **RollBackJob** – returns *boolean*	
RollBackJob(**JobName** *name*, **JobUser** *user,* **JobNumber** *job,* **Moment** *timestamp*) RollBackJob(**JobName** *name*, **JobUser** *user,* **JobNumber** *job*)	
For the specified IBM i job (**JobName, JobUser, JobNumber**), deletes the following: • Any subtable entries created by this job. If **Moment** is specified, only entries created since that **Moment** are deleted. If a subtable entry contains metadata, the ENTHEAD record for the associated entity is updated to reflect the prior value of that metadata. • Any entities created by this job. If **Moment** is specified, only entities created since that **Moment** are deleted. The end result is that the effects of the job since it began or since the specified **Moment** have been eliminated. A value of TRUE is returned if the operation is completely successful, otherwise a FALSE is returned. Note: No journaling or commitment control is required by this function.	
Exports for RPG	STDENTUTIL(ROLLBACKJOB)
Exports for SQL	STDENTUTIL(ROLLBACKJOB4) STDENTUTIL(ROLLBACKJOB3)

Miscellaneous functions (cont.)

Function **PrevMoment** – returns *timestamp*	
PrevMoment(**Moment** *timestamp*)	
Returns a time stamp that is one microsecond prior to the specified **Moment**. Intended for use by SQL functions and stored procedures due to the lack of microsecond level date arithmetic within SQL. Also used by the Temporal Integrity triggers when updating ENTHEAD metadata to a previous value.	
Exports for RPG	STDENTUTIL(PREVMOMENT)
Exports for SQL	STDENTUTIL(PREVMOMENT)

Function **ValidMethod** – returns *boolean*	
ValidMethod(**Method** *nickname)*	
Verifies that the specified **Method** nickname has been defined in the database SYSFUNCS table as a function. This function must accept an *EntityID* as its lone argument and imply one of the Inuendo data types as its result. See the section titled "Virtual Methods" for an explanation on how such functions may be invoked in an Inuendo expression. Returns a true or false value indicating whether the method nickname is valid.	
Exports for RPG	STDENTINP(VALIDMETHOD)
Exports for SQL	None

Function **UpperCase** – returns *note*	
UpperCase(**FreeText** *note*)	
Returns a simple upper case translation of the specified **FreeText**. Used primarily by the GET functions when validating *Class*, *Property* and *Method* names.	
Exports for RPG	STDENTINP(UPPERCASE)
Exports for SQL	None

Time Travel functions

Function **setSessionMoment** – returns *boolean*	
setSessionMoment(**SessionDate** *char(7),* **SessionTime** *char(6),* **SessionMicr** *integer*)	
Calculates a Moment in time using the specified **SessionDate** (CYYMMDD), **SessionTime** (HHMMSS) and **SessionMicr** (microseconds 0-999999), then places that time stamp inside the user space QTEMP/SETSSNMOM. The presence of this user space automatically disables all native Inuendo output operations. Used by the SETSSNMOM command. Returns a *true* value if the user space has been successfully set to the Moment value, *false* otherwise.	
Exports for RPG	STDENTINP(SETSESSIONMOMENT)
Exports for SQL	None

Function **getSessionMoment** – returns *timestamp*	
getSessionMoment()	
Returns the Moment value stored inside the user space QTEMP/SETSSNMOM, or a low value if the user space does not exist. Used by the DSPSSNMOM command.	
Exports for RPG	STDENTINP(GETSESSIONMOMENT)
Exports for SQL	None

Function **clrSessionMoment** – returns *boolean*	
clrSessionMoment()	
Deletes the user space QTEMP/SETSSNMOM. The absence of this user space automatically enables all native Inuendo output operations. Used by the CLRSSNMOM command. Returns a *true* value if the operation was successful, *false* otherwise.	
Exports for RPG	STDENTINP(CLRSESSIONMOMENT)
Exports for SQL	None

Time Travel functions (cont.)

Function **SessionMomentActive** – returns *boolean*	
SessionMomentActive()	
Returns a *true* value if the user space QTEMP/SETSSNMOM exists and contains a valid Moment value, *false* otherwise. Used by all native Inuendo output operations to determine whether they are disabled.	
Exports for RPG	STDENTINP(SESSIONMOMENTACTIVE)
Exports for SQL	None

Statistical functions

These functions perform basic aggregation on numeric property values at either the Entity or Parent level.

Property Average function series – returns *number*
PropertyAvgDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertyAvgThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertyAvgSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertyAvg(**EntityID** *entityID*, **Property** *note*)
Returns the weighted average of each value held by the specified **Property** for the specified **EntityID**, based on the number of milliseconds each value was in effect over four distinct time periods: • **During**: The absolute starting **FromMoment** and ending **ToMoment** are specified. • **Through**: The **FromMoment** defaults to the Moment at which a value was first assigned to this **Property** and only the **ToMoment** is specified. • **Since**: The **ToMoment** defaults to the current system time and only the **FromMoment** is specified. • **None**: The **FromMoment** defaults to the Moment at which a value was first assigned to this **Property** and The **ToMoment** defaults to the current system time. Neither are specified. NOTE: Other aggregation types in this series will use the same four time periods as arguments.

Exports for RPG	STDPRPAGGR(PROPERTYAVGDURING) STDPRPAGGR(PROPERTYAVGTHROUGH) STDPRPAGGR(PROPERTYAVGSINCE) STDPRPAGGR(PROPERTYAVG)
Exports for SQL	STDPRPAGGR(PROPERTYAVGDURING) STDPRPAGGR(PROPERTYAVGTHROUGH) STDPRPAGGR(PROPERTYAVGSINCE) STDPRPAGGR(PROPERTYAVG)

Property Minimum function series – returns *number*	
PropertyMinDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertyMinThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertyMinSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertyMin(**EntityID** *entityID*, **Property** *note*)	
Returns the minimum value held by the specified **Property** for the specified **EntityID** at any time during the specified time period. The four intervals are the same as those used by the Property Average series:	
Exports for RPG	STDPRPAGGR(PROPERTYMINDURING) STDPRPAGGR(PROPERTYMINTHROUGH) STDPRPAGGR(PROPERTYMINSINCE) STDPRPAGGR(PROPERTYMIN)
Exports for SQL	STDPRPAGGR(PROPERTYMINDURING) STDPRPAGGR(PROPERTYMINTHROUGH) STDPRPAGGR(PROPERTYMINSINCE) STDPRPAGGR(PROPERTYMIN)

Property Maximum function series – returns *number*	
PropertyMaxDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertyMaxThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertyMaxSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertyMax(**EntityID** *entityID*, **Property** *note*)	
Returns the maximum value held by the specified **Property** for the specified **EntityID** at any time during the specified time period. The four intervals are the same as those used by the Property Average series:	
Exports for RPG	STDPRPAGGR(PROPERTYMAXDURING) STDPRPAGGR(PROPERTYMAXTHROUGH) STDPRPAGGR(PROPERTYMAXSINCE) STDPRPAGGR(PROPERTYMAX)
Exports for SQL	STDPRPAGGR(PROPERTYMAXDURING) STDPRPAGGR(PROPERTYMAXTHROUGH) STDPRPAGGR(PROPERTYMAXSINCE) STDPRPAGGR(PROPERTYMAX)

Property Sum function series – returns *number*	
PropertySumDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertySumThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertySumSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertySum(**EntityID** *entityID*, **Property** *note*)	
Returns the sum of all values assigned to the specified **Property** for the specified **EntityID** at any time during the specified time period. Used by the Mean series of functions, otherwise has little statistical relevance. The four intervals are the same as those used by the Property Average series:	
Exports for RPG	STDPRPAGGR(PROPERTYSUMDURING) STDPRPAGGR(PROPERTYSUMTHROUGH) STDPRPAGGR(PROPERTYSUMSINCE) STDPRPAGGR(PROPERTYSUM)
Exports for SQL	STDPRPAGGR(PROPERTYSUMDURING) STDPRPAGGR(PROPERTYSUMTHROUGH) STDPRPAGGR(PROPERTYSUMSINCE) STDPRPAGGR(PROPERTYSUM)

Property Count function series – returns *number*	
PropertyCountDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertyCountThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertyCountSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertyCount(**EntityID** *entityID*, **Property** *note*)	
Returns the count of value assignments (PUT operations) of the specified **Property** for the specified **EntityID** at any time during the specified time period. Used by the Mean series of functions, otherwise has little statistical relevance, although the higher the count, the more volatile the property has been. The four intervals are the same as those used by the Property Average series:	
Exports for RPG	STDPRPAGGR(PROPERTYCOUNTDURING) STDPRPAGGR(PROPERTYCOUNTTHROUGH) STDPRPAGGR(PROPERTYCOUNTSINCE) STDPRPAGGR(PROPERTYCOUNT)
Exports for SQL	STDPRPAGGR(PROPERTYCOUNTDURING) STDPRPAGGR(PROPERTYCOUNTTHROUGH) STDPRPAGGR(PROPERTYCOUNTSINCE) STDPRPAGGR(PROPERTYCOUNT)

Property Mean function series – returns *number*	
PropertyMeanDuring(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*, **ToMoment** *timestamp*) PropertyMeanThrough(**EntityID** *entityID*, **Property** *note*, **ToMoment** *timestamp*) PropertyMeanSince(**EntityID** *entityID*, **Property** *note*, **FromMoment** *timestamp*) PropertyMean(**EntityID** *entityID*, **Property** *note*)	
Returns the non-weighted average of each value held by the specified **Property** for the specified **EntityID** within the specified time period, regardless of how long each value was in effect. The four intervals are the same as those used by the Property Average series:	
Exports for RPG	STDPRPAGGR(PROPERTYMEANDURING) STDPRPAGGR(PROPERTYMEANTHROUGH) STDPRPAGGR(PROPERTYMEANSINCE) STDPRPAGGR(PROPERTYMEAN)
Exports for SQL	STDPRPAGGR(PROPERTYMEANDURING) STDPRPAGGR(PROPERTYMEANTHROUGH) STDPRPAGGR(PROPERTYMEANSINCE) STDPRPAGGR(PROPERTYMEAN)

Entity Average – returns *number*	
EntityAvg(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*, **Moment** *timestamp*) EntityAvg(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*)	
Returns the straight average of all values of the specified **Property** for all entities of the specified **Class** that are subordinate to the specified **EntityID** (that is, their ParentID matches the specified **EntityID**), using the values in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Exports for RPG	STDENTAGGR(ENTITYAVGM) STDENTAGGR(ENTITYAVG)
Exports for SQL	STDENTAGGR(ENTITYAVGM) STDENTAGGR(ENTITYAVG)

Entity Minimum – returns *number*

EntityMin(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*, **Moment** *timestamp*)
EntityMin(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*)

Returns the minimum of all values of the specified **Property** for all entities of the specified **Class** that are subordinate to the specified **EntityID** (that is, their ParentID matches the specified **EntityID**), using the values in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.

Exports for RPG	STDENTAGGR(ENTITYMINM) STDENTAGGR(ENTITYMIN)
Exports for SQL	STDENTAGGR(ENTITYMINM) STDENTAGGR(ENTITYMIN)

Entity Maximum – returns *number*

EntityMax(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*, **Moment** *timestamp*)
EntityMax(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*)

Returns the maximum of all values of the specified **Property** for all entities of the specified **Class** that are subordinate to the specified **EntityID** (that is, their ParentID matches the specified **EntityID**), using the values in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.

Exports for RPG	STDENTAGGR(ENTITYMAXM) STDENTAGGR(ENTITYMAX)
Exports for SQL	STDENTAGGR(ENTITYMAXM) STDENTAGGR(ENTITYMAX)

Entity Sum – returns *number*

EntitySum(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*, **Moment** *timestamp*)
EntitySum(**EntityID** *entityID*, **Class** *nickname*, **Property** *note*)

Returns the sum of all values of the specified **Property** for all entities of the specified **Class** that are subordinate to the specified **EntityID** (that is, their ParentID matches the specified **EntityID**), using the values in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.

Exports for RPG	STDENTAGGR(ENTITYSUMM) STDENTAGGR(ENTITYSUM)
Exports for SQL	STDENTAGGR(ENTITYSUMM) STDENTAGGR(ENTITYSUM)

Entity Count – returns *number*	
EntitySum(**EntityID** *entityID*, **Class** *nickname*, **Moment** *timestamp*) EntitySum(**EntityID** *entityID*, **Class** *nickname*)	
Returns the count of all entities of the specified **Class** that are subordinate to the specified **EntityID** (that is, their ParentID matches the specified **EntityID**), that existed at the specified **Moment**. If **Moment** is not specified, the current system time stamp is assumed.	
Exports for RPG	STDENTAGGR(ENTITYCOUNTM) STDENTAGGR(ENTITYCOUNT)
Exports for SQL	STDENTAGGR(ENTITYCOUNTM) STDENTAGGR(ENTITYCOUNT)

Audit trail procedures

These procedures create result sets for use with client or web applications.

Procedure **Snapshot** – produces *result set* (**Property** *nickname*, **Descriptor** *note*, **Value** *note*)	
Snapshot(**EntityID** *entityID,* **Moment** *timestamp)* Snapshot(**EntityID** *entityID)*	
Produces a row for each **Property** defined in ENTPROP for the Class of the specified **EntityID**. Each row also contains the **Descriptor** associated with the **Property**, and the **Value** (cast as a character) that was in effect at the specified **Moment**. If **Moment** is not specified, the current system time stamp is used. The rows are presented in the order of the Sequencer field in ENTPROP.	
Exports for RPG	STDENTRULE(SNAPSHOT)
Exports for SQL	STDENTSQL1(SNAPSHOT2) STDENTSQL1(SNAPSHOT1)

Procedure **PropertyLife** – produces *result set* (**ChangeTime** *timestamp*, **ChangeUser** *user*, **ChangeJobName** *char(10)*, **ChangeJobNum** *char(6)*, **ChangeProgram** *char(10)*, **Value** *note*)	
PropertyLife(**EntityID** *entityID,* **Property** *nickname,* **Moment** *timestamp)* PropertyLife(**EntityID** *entityID,* **Property** *nickname)*	
Produces a row for each historical instance when the **Value** of the specified **Property** for the specified **EntityID** was reassigned. If **Moment** is specified, only the instances prior to that **Moment** are included. The rows contain the standard IBM i job identifiers (user, name and number) and are presented in timestamp sequence.	
Exports for RPG	STDENTRULE(PROPERTYLIFE)
Exports for SQL	STDENTSQL1(PROPERTYLIFE3) STDENTSQL1(PROPERTYLIFE2)

Audit trail procedures (cont.)

Procedure **EntityList** – produces *result set* (**Class** *nickname*, **EntityID** *entityID*, **Descriptor** *note*, **LegacyA** *note*, **LegacyN** *bigint*)
EntityList(**ParentID** *entityID,* **Class** *nickname,* **LegacyA** *note,* **LegacyN** *bigint,* **Descriptor** *note)*
Produces a row for each **EntityID** of the specified **Class** with a matching **ParentID**. Positioning arguments Descriptor, LegacyA and LegacyN are mutually exclusive. Specifying a value for one of these arguments will cause the list to be sorted on that column and contain only values equal to or greater than the argument. This procedure may be revisited in the future to allow for simpler invocations and Moment based selection. However, since **Descriptor** and **LegacyA** are the same type, overloading options are limited. Designed specifically for search utilities.

Exports for RPG	STDENTRULE(ENTITYLIST)
Exports for SQL	STDENTRULE(ENTITYLIST)

Procedure **EntityLife** – produces *result set* (**EntityID** *entityID*, **EventTime** *timestamp*, **EventUser** *name*, **EventJnam** *name*, **EventJnum** *job,* **EventProg** *name,* **Property** *nickname*, **DataType** *nickname*, **Value** *note*)
EntityLife(**EntityID** *entityID,* **Moment** *timestamp)*
Produces a row representing the initial creation of an **EntityID** plus one row for each historical assignment of any of its property values (which are expressed in this result set as a *note)*. If **Moment** is specified, only the instances prior to that **Moment** are included. The rows contain the standard IBM i job identifiers (user, name and number) and are presented in timestamp sequence.

Exports for RPG	STDENTRULE(ENTITYLIFE)
Exports for SQL	STDENTSQL2(ENTITYLIFE2) STDENTSQL2(ENTITYLIFE1)

Entity Group procedures

Procedure **EntityGroupDateRange** – produces *result set* (**ENTHEAD**)	
EntityGroupDateRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *date,* **RangeHigh** *date,* **Moment** *timestamp)* EntityGroupDateRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *date,* **RangeHigh** *date)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified date **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a date property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPDATERANGEM) STDENTRULE(ENTITYGROUPDATERANGE) STDENTRULE(ENTITYGROUPDATE)
Exports for SQL	STDENTRULE(ENTITYGROUPDATERANGEM) STDENTRULE(ENTITYGROUPDATERANGE)

Procedure **EntityGroupDateValue** – produces *result set* (**ENTHEAD**)	
EntityGroupDateValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *date,* **Moment** *timestamp)* EntityGroupDateValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *date)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified date **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a date property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPDATEVALUEM) STDENTRULE(ENTITYGROUPDATEVALUE) STDENTRULE(ENTITYGROUPDATE)
Exports for SQL	STDENTRULE(ENTITYGROUPDATEVALUEM) STDENTRULE(ENTITYGROUPDATEVALUE)

Entity Group procedures (cont.)

Procedure **EntityGroupFlagRange** – produces *result set* (**ENTHEAD**)	
EntityGroupFlagRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *flag,* **RangeHigh** *flag,* **Moment** *timestamp)* EntityGroupFlagRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *flag,* **RangeHigh** *flag)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified flag **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a flag property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPFLAGRANGEM) STDENTRULE(ENTITYGROUPFLAGRANGE) STDENTRULE(ENTITYGROUPFLAG)
Exports for SQL	STDENTRULE(ENTITYGROUPFLAGRANGEM) STDENTRULE(ENTITYGROUPFLAGRANGE)

Procedure **EntityGroupFlagValue** – produces *result set* (**ENTHEAD**)	
EntityGroupFlagValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *flag,* **Moment** *timestamp)* EntityGroupFlagValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *flag)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified flag **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a flag property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPFLAGVALUEM) STDENTRULE(ENTITYGROUPFLAGVALUE) STDENTRULE(ENTITYGROUPFLAG)
Exports for SQL	STDENTRULE(ENTITYGROUPFLAGVALUEM) STDENTRULE(ENTITYGROUPFLAGVALUE)

Entity Group procedures (cont.)

Procedure **EntityGroupNoteRange** – produces *result set* (**ENTHEAD**)	
EntityGroupNoteRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *note,* **RangeHigh** *note,* **Moment** *timestamp)* EntityGroupNoteRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *note,* **RangeHigh** *note)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified note **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a note property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPNOTERANGEM) STDENTRULE(ENTITYGROUPNOTERANGE) STDENTRULE(ENTITYGROUPNOTE)
Exports for SQL	STDENTRULE(ENTITYGROUPNOTERANGEM) STDENTRULE(ENTITYGROUPNOTERANGE)

Procedure **EntityGroupNoteValue** – produces *result set* (**ENTHEAD**)	
EntityGroupNoteValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *note,* **Moment** *timestamp)* EntityGroupNoteValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *note)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified note **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a note property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPNOTEVALUEM) STDENTRULE(ENTITYGROUPNOTEVALUE) STDENTRULE(ENTITYGROUPNOTE)
Exports for SQL	STDENTRULE(ENTITYGROUPNOTEVALUEM) STDENTRULE(ENTITYGROUPNOTEVALUE)

Entity Group procedures (cont.)

Procedure **EntityGroupNumbRange** – produces *result set* (**ENTHEAD**)	
EntityGroupNumbRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *number,* **RangeHigh** *number,* **Moment** *timestamp)* EntityGroupNumbRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *number,* **RangeHigh** *number)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified number **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a number property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPNUMBRANGEM) STDENTRULE(ENTITYGROUPNUMBRANGE) STDENTRULE(ENTITYGROUPNUMB)
Exports for SQL	STDENTRULE(ENTITYGROUPNUMBRANGEM) STDENTRULE(ENTITYGROUPNUMBRANGE)

Procedure **EntityGroupNumbValue** – produces *result set* (**ENTHEAD**)	
EntityGroupNumbValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *number,* **Moment** *timestamp)* EntityGroupNumbValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *number)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified number **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to a number property of a linked Entity.	
Exports for RPG	STDENTRULE(ENTITYGROUPNUMBVALUEM) STDENTRULE(ENTITYGROUPNUMBVALUE) STDENTRULE(ENTITYGROUPNUMB)
Exports for SQL	STDENTRULE(ENTITYGROUPNUMBVALUEM) STDENTRULE(ENTITYGROUPNUMBVALUE)

Entity Group procedures (cont.)

Procedure **EntityGroupNotxRange** – produces *result set* (**ENTHEAD**)	
EntityGroupNotxRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *note,* **RangeHigh** *note,* **Moment** *timestamp)* EntityGroupNotxRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *note,* **RangeHigh** *note)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified encrypted note **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to an encrypted note property of a linked Entity. The **Range** arguments are passed in unencrypted form.	
Exports for RPG	STDENTRULE(ENTITYGROUPNOTXRANGEM) STDENTRULE(ENTITYGROUPNOTXRANGE) STDENTRULE(ENTITYGROUPNOTX)
Exports for SQL	STDENTRULE(ENTITYGROUPNOTXRANGEM) STDENTRULE(ENTITYGROUPNOTXRANGE)

Procedure **EntityGroupNotxValue** – produces *result set* (**ENTHEAD**)	
EntityGroupNotxValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *note,* **Moment** *timestamp)* EntityGroupNotxValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *note)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified encrypted note **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to an encrypted note property of a linked Entity. The **Value** argument is passed in unencrypted form.	
Exports for RPG	STDENTRULE(ENTITYGROUPNOTXVALUEM) STDENTRULE(ENTITYGROUPNOTXVALUE) STDENTRULE(ENTITYGROUPNOTX)
Exports for SQL	STDENTRULE(ENTITYGROUPNOTXVALUEM) STDENTRULE(ENTITYGROUPNOTXVALUE)

Entity Group procedures (cont.)

Procedure **EntityGroupNumxRange** – produces *result set* (**ENTHEAD**)	
EntityGroupNumxRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *number,* **RangeHigh** *number,* **Moment** *timestamp)* EntityGroupNumxRange(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **RangeLow** *number,* **RangeHigh** *number)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified encrypted number **Property** within the specified **Range** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to an encrypted number property of a linked Entity. The **Range** arguments are passed in unencrypted form.	
Exports for RPG	STDENTRULE(ENTITYGROUPNUMXRANGEM) STDENTRULE(ENTITYGROUPNUMXRANGE) STDENTRULE(ENTITYGROUPNUMX)
Exports for SQL	STDENTRULE(ENTITYGROUPNUMXRANGEM) STDENTRULE(ENTITYGROUPNUMXRANGE)

Procedure **EntityGroupNumxValue** – produces *result set* (**ENTHEAD**)	
EntityGroupNumxValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *number,* **Moment** *timestamp)* EntityGroupNumxValue(**ParentID** *entityID,* **Class** *nickname,* **Property** *note,* **Value** *number)*	
Produces a row in the same format as table ENTHEAD for each **EntityID** of the specified **Class** subordinate to the specified **ParentID**, and having a value for the specified encrypted number **Property** that matches the specified **Value** in effect at the specified **Moment**. If no **Moment** is specified, the current system time stamp or Session Moment (if active) is used. The **Property** may be a period delimited path to an encrypted number property of a linked Entity. The **Value** argument is passed in unencrypted form.	
Exports for RPG	STDENTRULE(ENTITYGROUPNUMXVALUEM) STDENTRULE(ENTITYGROUPNUMXVALUE) STDENTRULE(ENTITYGROUPNUMX)
Exports for SQL	STDENTRULE(ENTITYGROUPNUMXVALUEM) STDENTRULE(ENTITYGROUPNUMXVALUE)

5. Virtual Methods

Virtual methods are a means to leverage new or existing business logic seamlessly through the Inuendo GET functions. It involves SQL user defined functions (UDF) in the Inuendo schema, which either perform the business logic themselves or link to executable units written in other high level languages, capable of implying a return value. Such UDF's are defined using the CREATE FUNCTION statement in SQL, or an equivalent graphical wizard, such as IBM i Navigator or IBM Data Studio.

Once these UDF's have been created, their names may be used by the GET functions as either the lone property name or the final segment in a period delimited path. When the GET functions attempt to validate the Property name argument, they first determine whether or not a UDF of the same name exists. If it does, it will execute that function, passing the EntityID (or the EntityID implied by the period delimited property path itself) as the lone argument. Therefore, these SQL functions support only a single argument of type *EntityID*.

The UDF must imply a return value compatible with one of the Inuendo data types. Likewise, only the Inuendo GET function associated with this data type should reference the UDF name in its period delimited property path. Otherwise the GET function will return a neutral value, similar to situations where an invalid property name is passed as an argument.

Example:

An IBM i service program contains an exported procedure LifetimeSales, which analyzes customer order history and sums of the monetary value of all shipments for either an individual ship-to location, or the sum total of all ship-to locations. It returns a decimal(15,2) value. The UDF definition links the SQL name "LifetimeSales" to the exported procedure, thereby making the name "LifeTimeSales" eligible to use as either a property (or the last segment of a period delimited property path) on a getNumb function call, because getNumb returns a compatible decimal(25,7) value. Assume that the ORDER class contains a LINK property called CUSTOMER).

```
AllTimeSales = getNumb(CustomerID, 'LifetimeSales');          // or : separator for RPG

AllTimeSales = getNumb(OrderID, 'CUSTOMER.LIFETIMESALES');    // or : separator for RPG
```

6. Temporal Integrity

In order to ensure that the true state of all Inuendo entities and their associated properties is accurate for any moment in time, it is necessary to prevent any I/O operations on Inuendo tables performed outside the scope of the PUT family of functions. In addition, when subtable entries representing metadata are deleted as a result of the RollBackJob function, the associated ENTHEAD record must be updated to reflect the previous value of that metadata.

A series of triggers have been established by the installation process to protect the integrity of the data, relative to the moment at which it was created or updated.

Trigger program **TmpIntHead** – For I/O events on ENTHEAD
For inserts: None.
For deletes: If the delete occurs because of the **DeleteEntity** function, the operation is allowed and no action is taken. Otherwise the ENTHEAD record is re-inserted record exactly as it was, including the original EntityID. Name: TMPINTHEADD
For updates: If the update occurs because of one of the metadata PUT functions (PutClass, PutParentID, PutDescriptor, PutLegacyN, PutLegacyA or PutStatus), the operation is allowed and no action is taken. Otherwise the ENTHEAD record retains its “before” image, thereby negating the update. Name: TMPINTHEADU

Temporal integrity (cont.)

Trigger program **TmpIntDate** – For I/O events on subtable ENTDATE
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed and no action is taken. Otherwise the ENTDATE record is re-inserted record exactly as it was. Name: TMPINTDATED
For updates: The ENTDATE record retains its "before" image, thereby negating the update. Name: TMPINTDATEU

Trigger program **TmpIntFlag** – For I/O events on subtable ENTFLAG
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed. Otherwise the ENTFLAG record is re-inserted record exactly as it was. When the delete is allowed and the property nickname represents metadata (**Status**), the associated metadata PUT function is used to update ENTHEAD with the most recent value for that metadata property. Name: TMPINTFLAGD
For updates: The ENTFLAG record retains its "before" image, thereby negating the update. Name: TMPINTFLAGU

Temporal integrity (cont.)

Trigger program **TmpIntLink** – For I/O events on subtable ENTLINK
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed. Otherwise the ENTLINK record is re-inserted record exactly as it was. When the delete is allowed and the property nickname represents metadata (**ParentID**), the associated metadata PUT function is used to update ENTHEAD with the most recent value for that metadata property. Name: TMPINTLINKD
For updates: The ENTLINK record retains its "before" image, thereby negating the update. Name: TMPINTLINKU

Trigger program **TmpIntNote** – For I/O events on subtable ENTNOTE
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed. Otherwise the ENTNOTE record is re-inserted record exactly as it was. When the delete is allowed and the property nickname represents metadata (**Class, Descriptor, LegacyA**), the associated metadata PUT function is used to update ENTHEAD with the most recent value for that metadata property. Name: TMPINTNOTED
For updates: The ENTNOTE record retains its "before" image, thereby negating the update. Name: TMPINTNOTEU

Temporal integrity (cont.)

Trigger program **TmpIntNotx** – For I/O events on subtable ENTNOTX
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed and no action is taken. Otherwise the ENTNOTX record is re-inserted record exactly as it was. Name: TMPINTNOTXD
For updates: The ENTNOTX record retains its "before" image, thereby negating the update. Name: TMPINTNOTXU

Trigger program **TmpIntNumb** – For I/O events on subtable ENTNUMB
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed. Otherwise the ENTNUMB record is re-inserted record exactly as it was. When the delete is allowed and the property nickname represents metadata (**LegacyN**), the associated metadata PUT function is used to update ENTHEAD with the most recent value for that metadata property. Name: TMPINTNUMBD
For updates: The ENTNUMB record retains its "before" image, thereby negating the update. Name: TMPINTNUMBU

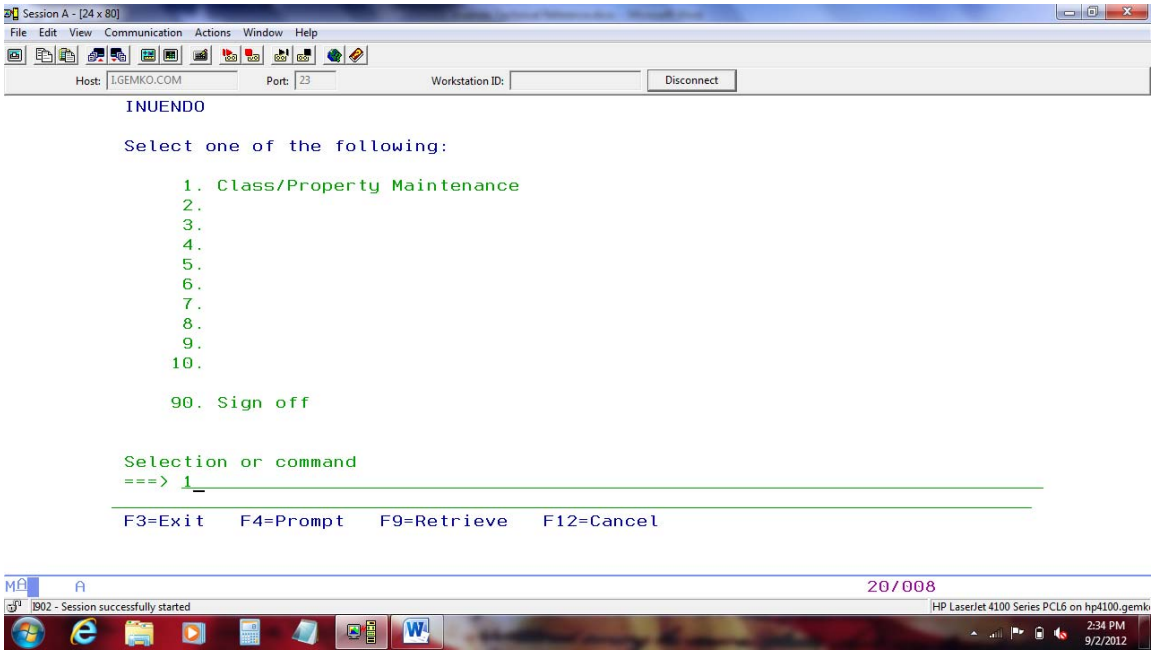
Temporal integrity (cont.)

Trigger program **TmpIntNumx** – For I/O events on subtable ENTNUMX
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed and no action is taken. Otherwise the ENTNUMX record is re-inserted record exactly as it was. Name: TMPINTNUMXD
For updates: The ENTNUMX record retains its “before” image, thereby negating the update. Name: TMPINTNUMXU

Trigger program **TmpIntDatx** – For I/O events on subtable ENTDATX
For inserts: None.
For deletes: If the delete occurs because of either the **DeleteEntity** or the **RollBackJob** function, the operation is allowed and no action is taken. Otherwise the ENTDATX record is re-inserted record exactly as it was. Name: TMPINTDATXD
For updates: The ENTNUMB record retains its “before” image, thereby negating the update. Name: TMPINTDATXU

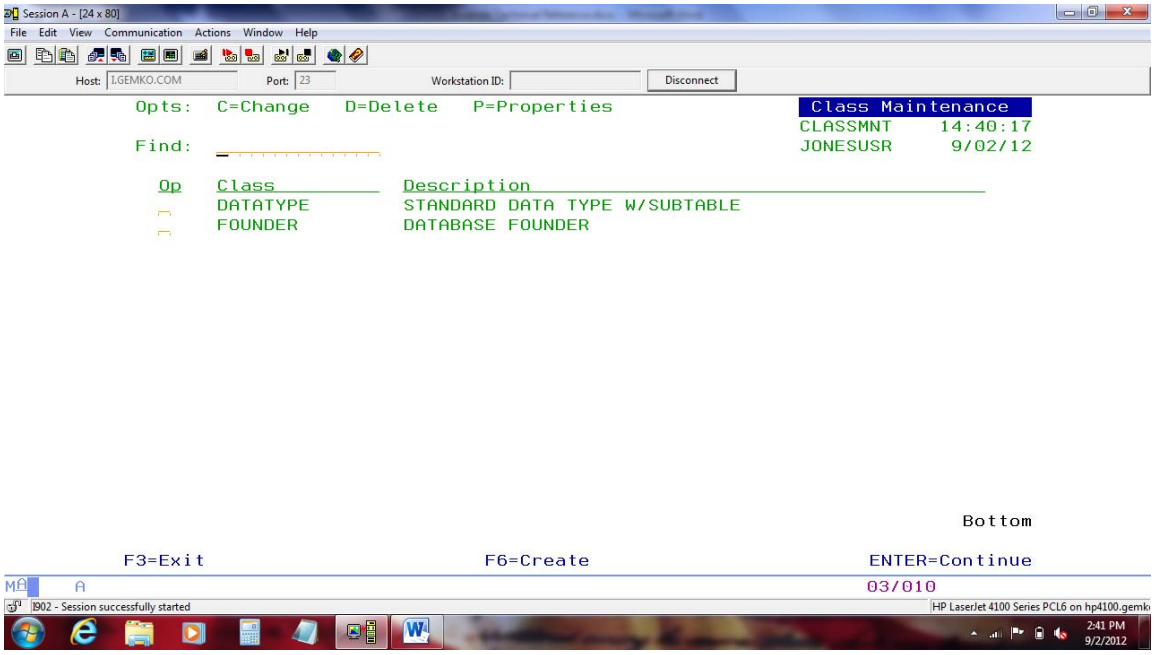
7. Class maintenance utility (5250 based)

Until a browser based equivalent is complete, this is the primary means to define Classes and their associated Properties (if required) in the ENTPROP table. It is accessible via Option 1 on the Inuendo main menu.

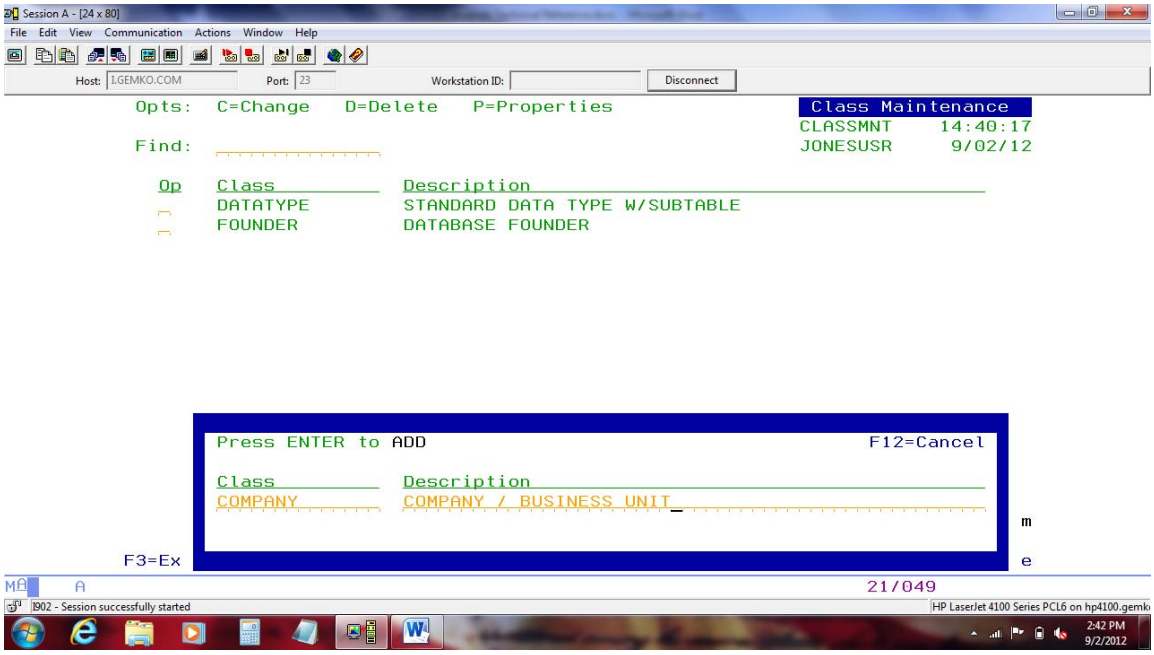


Class maintenance utility (cont.)

The list of defined Classes is displayed. Note that DATATYPE and FOUNDER are automatically loaded upon installation. To define a new Class, press F6:

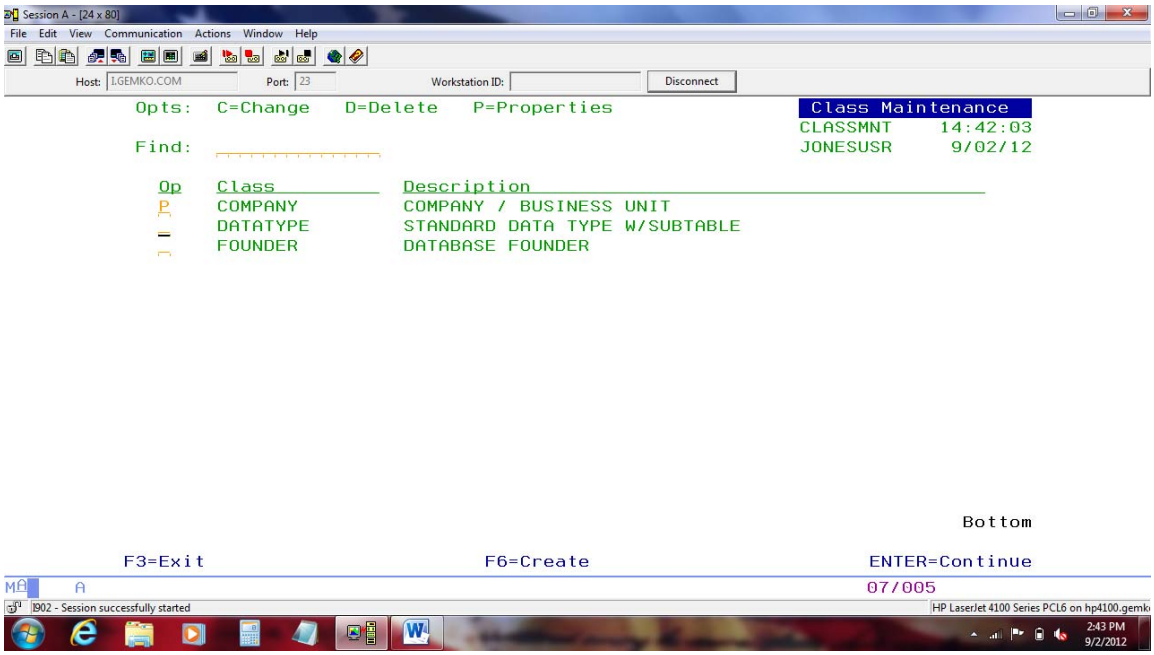


Fill in the Class name and description and press Enter:

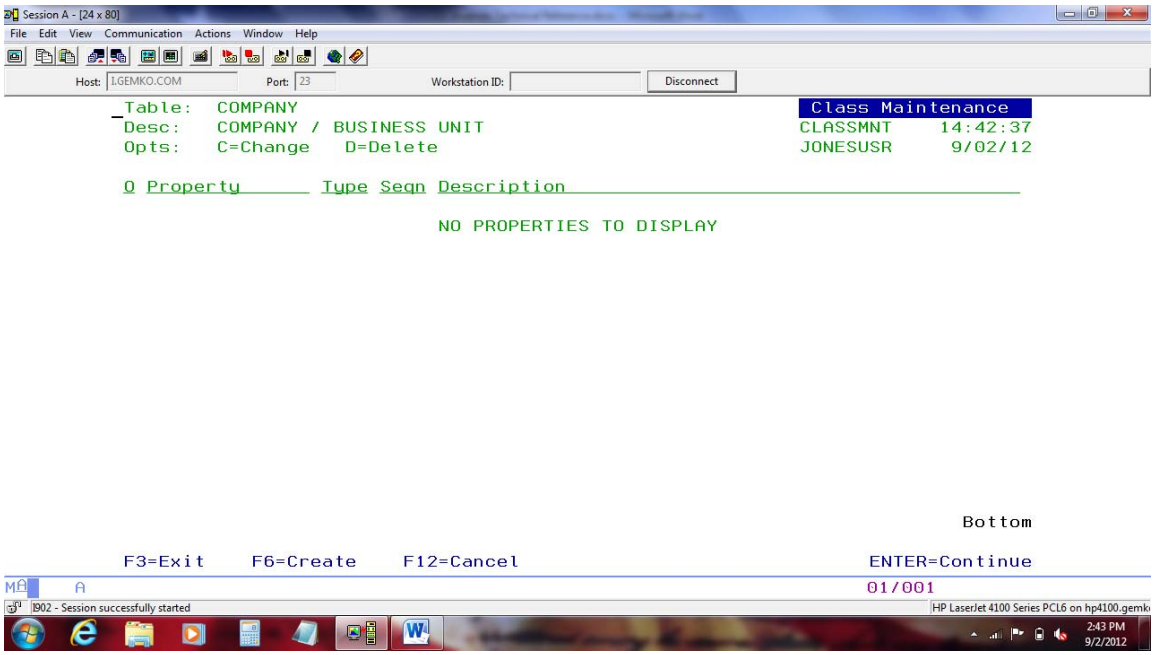


Class maintenance utility (cont.)

The new Class displays in the list. To assign Properties to it, specify the “P” option and press Enter:

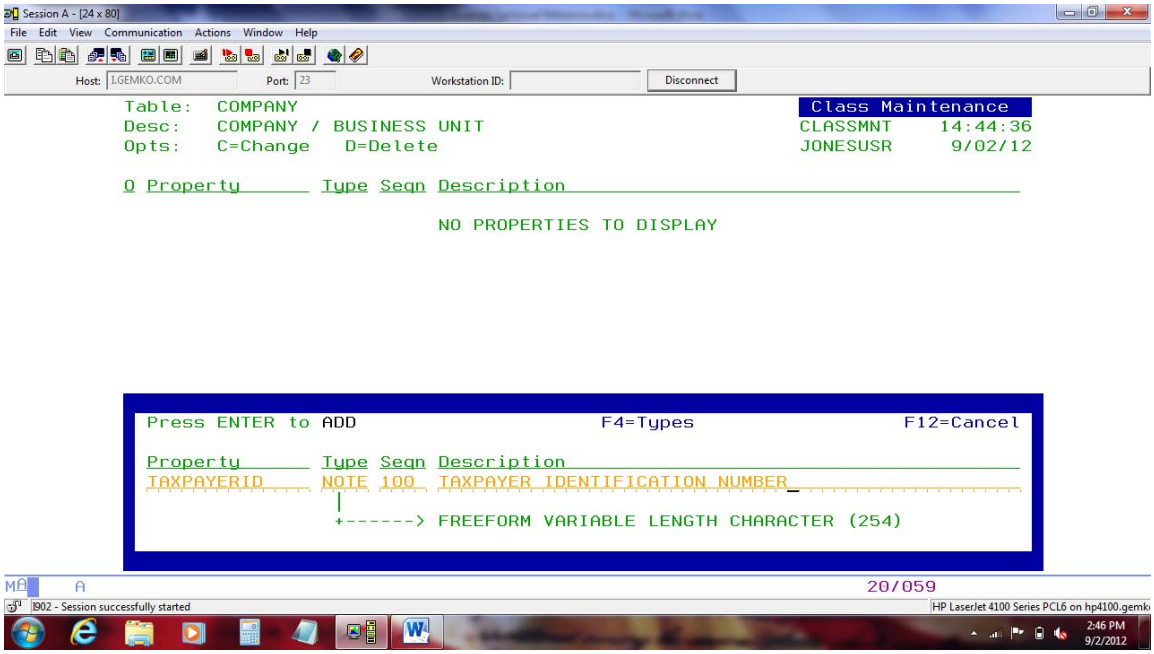


The list of Properties for the Class is shown. Press F6 to create a new Property:

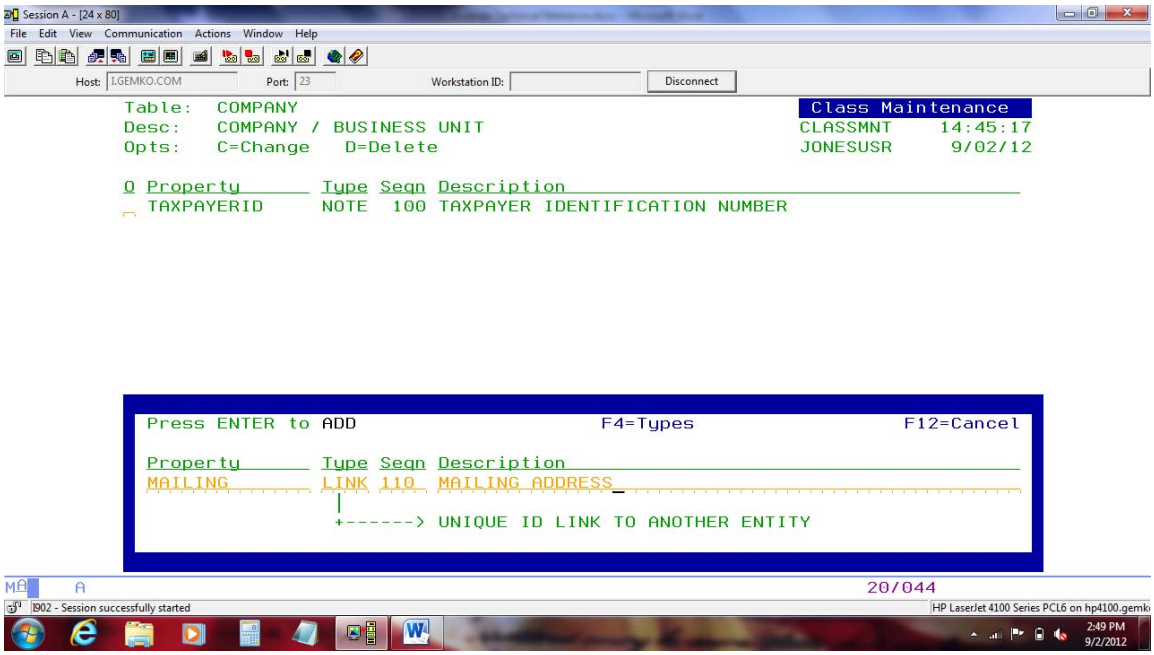


Class maintenance utility (cont.)

Key in the desired Property, Sequence and Description. Press F4 to select the desired Data Type on a rotating basis. Press Enter when satisfied:

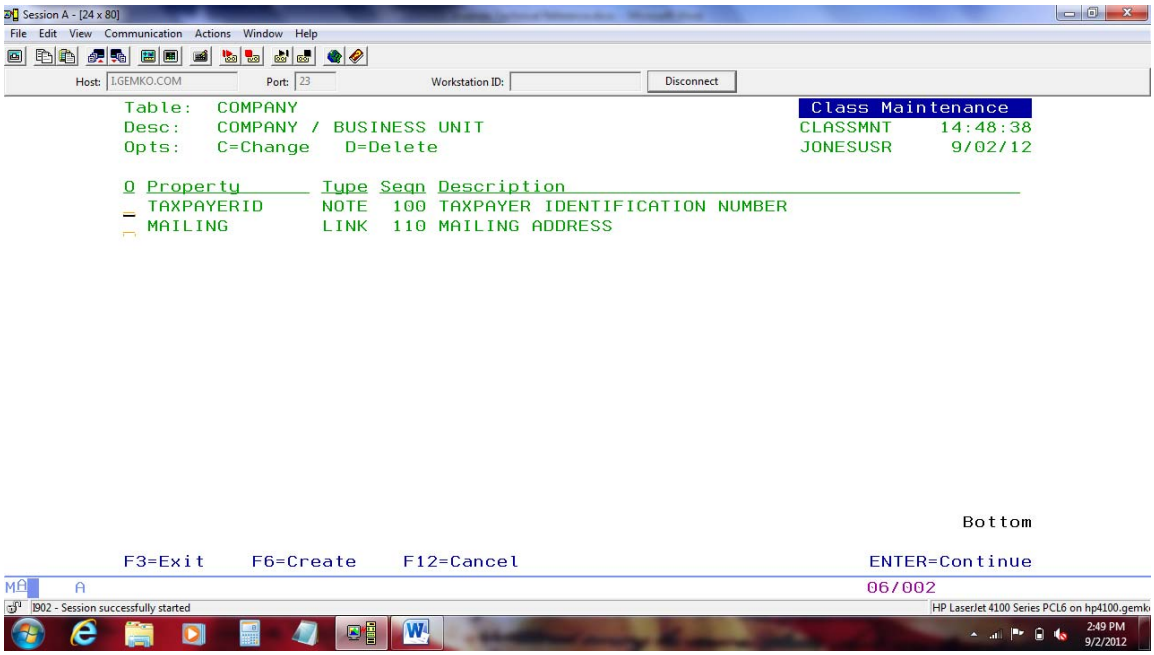


Specify additional Properties as desired. Note how MAILING is of type LINK. That means its value is an Entity ID. This example seems to suggest another class, perhaps called ADDRESS, containing typical address info:

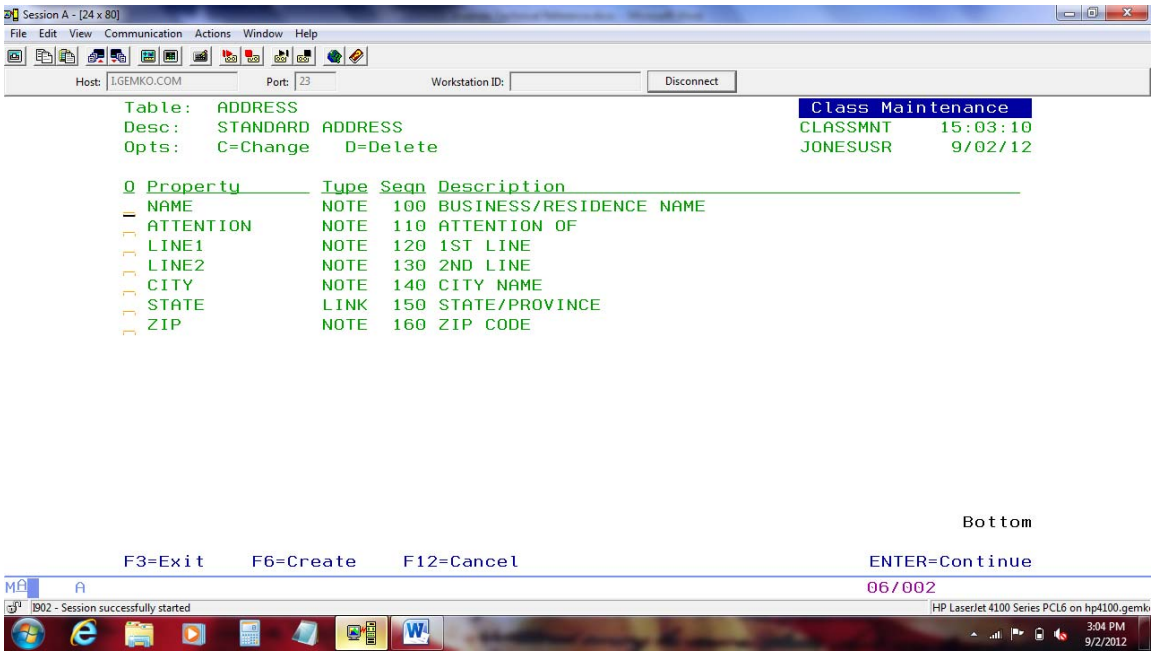


Class maintenance utility (cont.)

The list of Properties for the COMPANY Class now shows both:



Here is an example of what an ADDRESS Class might look like:



8. Time Travel Support

Inuendo **compliant** applications may travel backwards in time to a user specified Moment, and remain frozen there. The application will see the data exactly as it would have been at that Moment, however it cannot update the data while in the past.

A compliant application is defined as one which uses exclusively the Inuendo standard I/O functions for:

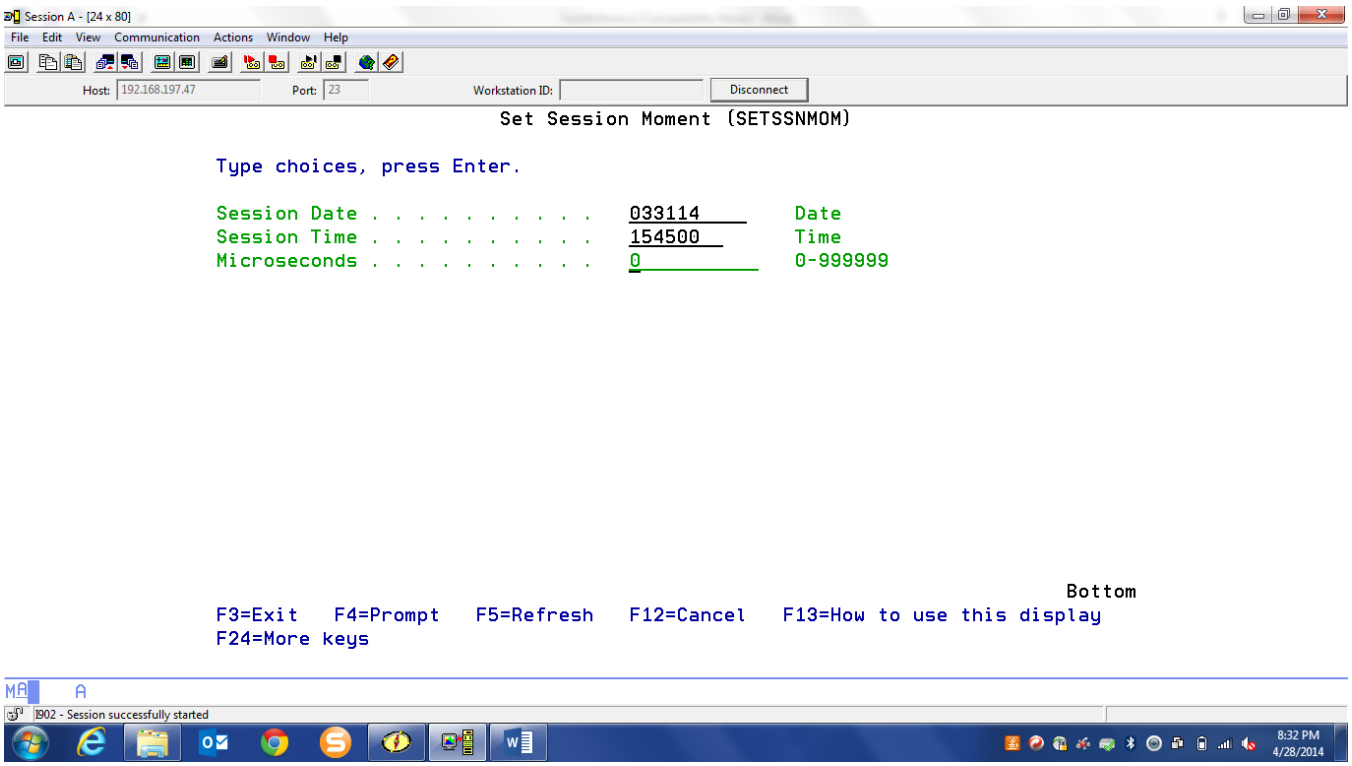
- All entity creation
- All property value setting (PUT functions)
- All identity resolution
- All property value retrieval (GET functions)

Three operating system commands have been added:

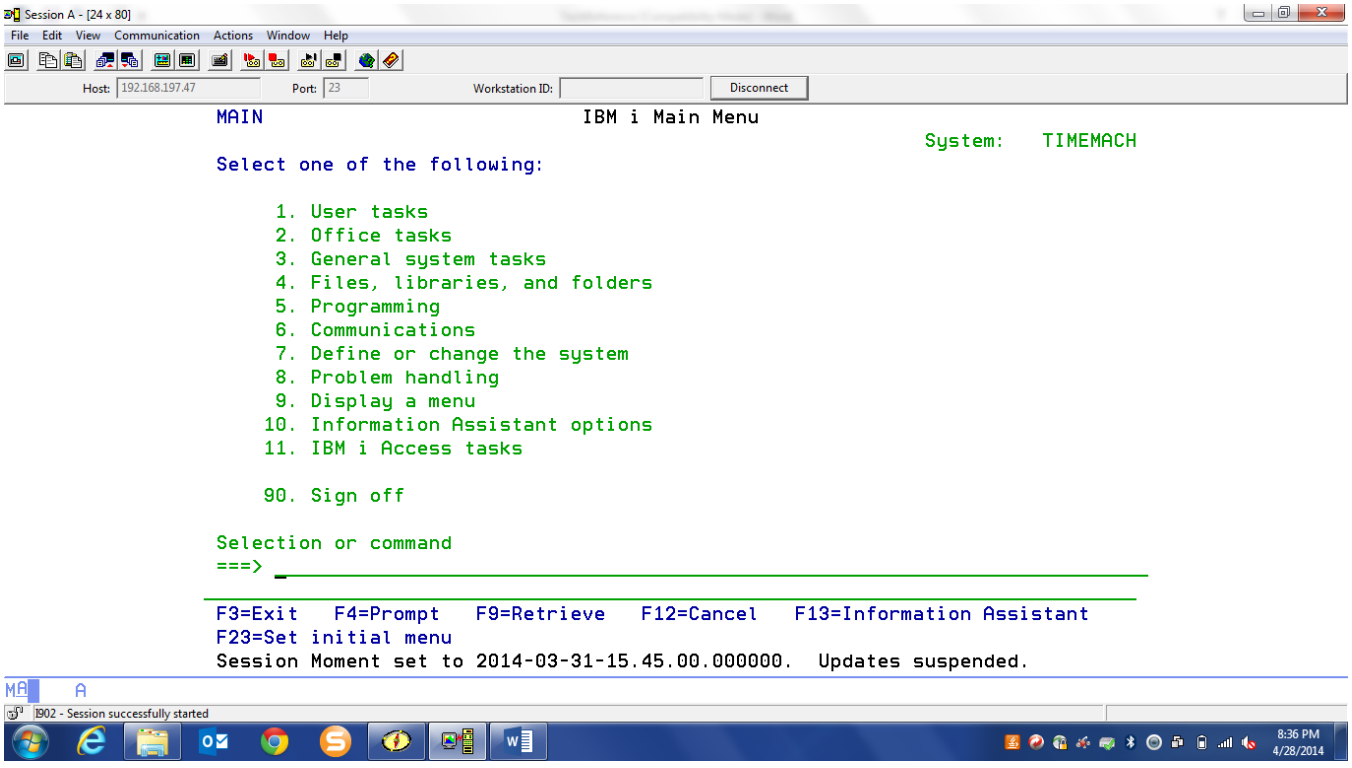
- **SETSSNMOM** (Set Session Moment) – Accepts a Moment argument in three pieces (date, time, microseconds) and records that Moment in a special user space in the QTEMP library. All native Inuendo output operations are automatically disabled, and all native Inuendo input operations will use this Moment in place of the system time stamp if no explicit Moment is specified as an argument of an Inuendo function call. Note that a subsequent issuing of this command will simply replace the contents of the user space with the newly specified Moment.
- **DSPSSNMOM** (Display Session Moment) – Echoes the Session Moment if one is in effect, in the program message line of the 5250 interactive display.
- **CLRSSNMOM** (Clear Session Moment) – Deletes the special user space in QTEMP, thereby re-enabling all native Inuendo standard output operations. All native Inuendo input operations will then use the system time stamp if no explicit Moment is specified as an argument of an Inuendo function call.

IMPORTANT: Do not tamper with user space QTEMP/SETSSNMOM once it has been created. Use only the above commands to manage the Session Moment. Otherwise undesired changes could be recorded in the database.

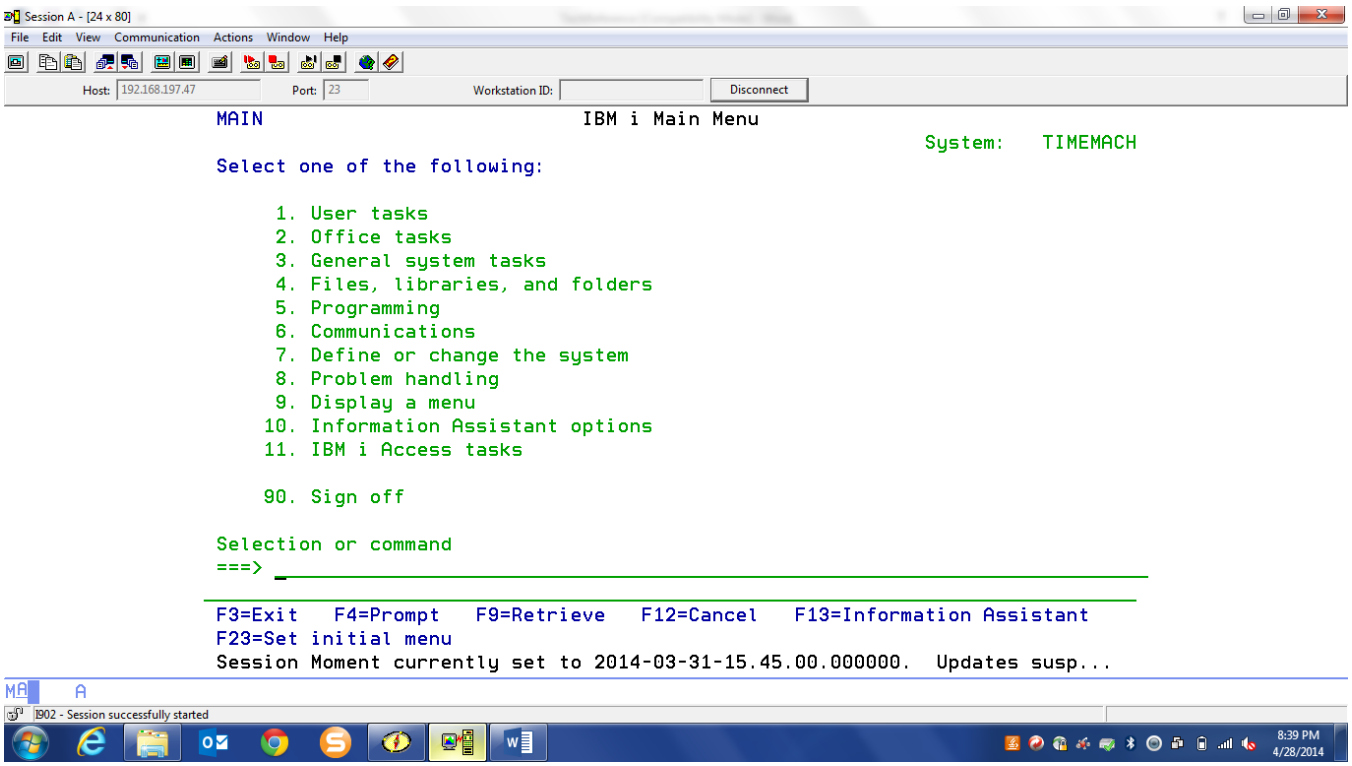
This example of SETSSNMOM would set the Session Moment to 2014-03-31-15.45.00.000000:



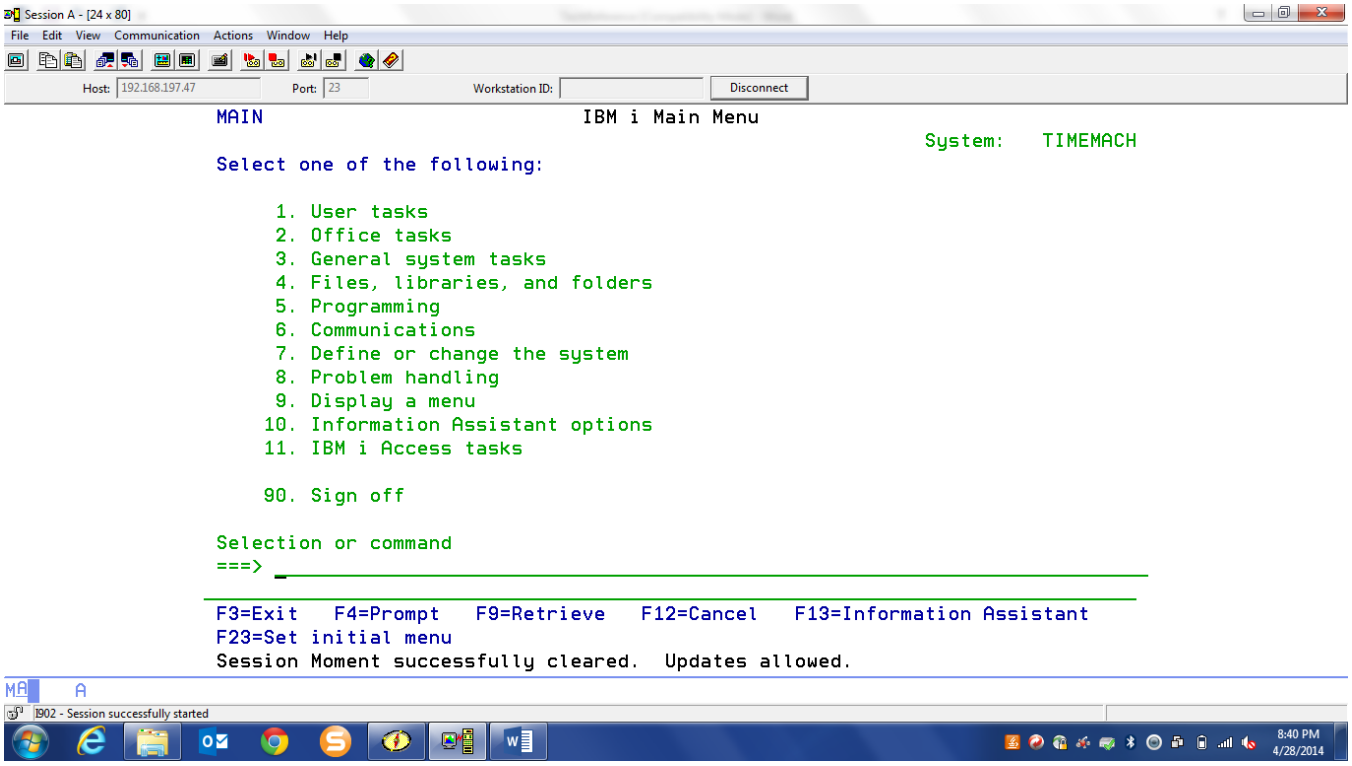
The Session Moment is echoed upon completion of the SETSSNMOM command.



The DSPSSNMOM has no parameters. It displays a similar echo screen to that of SETSSNMOM.



CLRSSNMOM take no parameters. It verifies that the Session Moment has been cleared.



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Version 3, 29 June 2007

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