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ABAP DSL Workbench

SAP TechED 2016

Barcelona, November 2016


Hello.
Hello.
Yes?
Number 77.
Take away?
No.
Hello.
Hello.
As always?
Yes.
Hello.
Hello.
As always?
Yes.
Where are the women?
Take away?
No.

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What is a Domain-Specific Language (DSL)?

"A Domain-Specific Language (DSL) is a small programming language, which focuses on a particular domain." (see Xtext manual, p.2)

Domain-Specific Language

GPL - General Purpose Language

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DSL: Asian Diner

```
1  DomainModel = asian_diner.
2
3  asian_diner =  order {order}.
4
5  order = meal [take_away].
6
7  meal = "number" "=" meal_number.
8
9  meal_number = "76"  | "77".
10
11 take_away = "take_away".
```

Modell: Lunch

```
1  number = 76
2  take_away
```

- /ADW/CL_ASIAN_DINER
  - Superclasses
  - Attribute
  - Methods
    - Inherited Methods
    - Redefinitions
      - END
      - GENERATE
      - START
  - Macros
    - ADW_BREAK

Methode | START

```
1  METHOD start.
2    CLEAR: price.
3  ENDMETHOD.
```

VALUE(ENTRY)	TYPE REF TO /ADW/CL_NODE	Kno
PARSER	TYPE REF TO /ADW/CL_PARSER	Allge
/ADW/CX_AMF		Allge

od | GENERATE

```
1  METHOD generate.
2
3    adw_break.
4
5    IF parser->md_nsymbol = 'meal_number'.
6      CASE entry->get_tsym( ).
7        WHEN '76'.
8          price = '6.50'.
9        WHEN '77'.
10         price = '6.00'.
11     ENDCASE.
12   ENDIF.
13
14   IF entry->is_terminal( ) = abap_true AND
15     entry->get_tsym( ) = 'take_away'.
16     price = price - '0.50'.
17   ENDIF.
18 ENDMETHOD.
```

Parameter	Type spec.	Description
PARSER	TYPE REF TO /ADW/CL_PARSER	Allgemeiner Parser

od | END | Active

```
1  METHOD end.
2    DATA text TYPE string.
3    CONCATENATE 'The price is' price 'EUR' INTO text SEPARATED BY space.
4    MESSAGE text TYPE 'I'.
5  ENDMETHOD.
```

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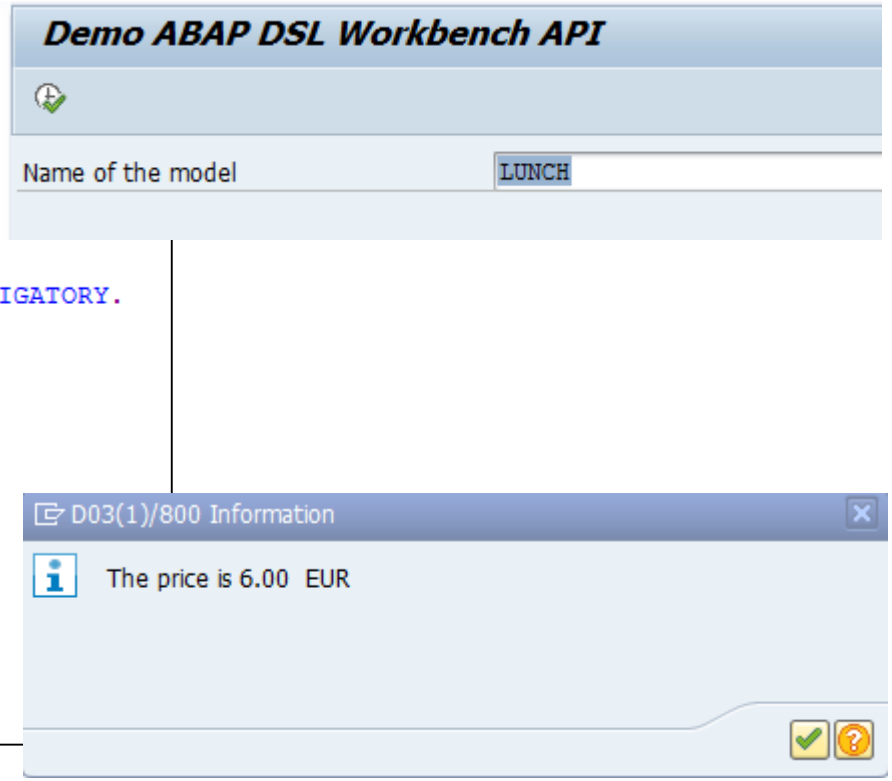
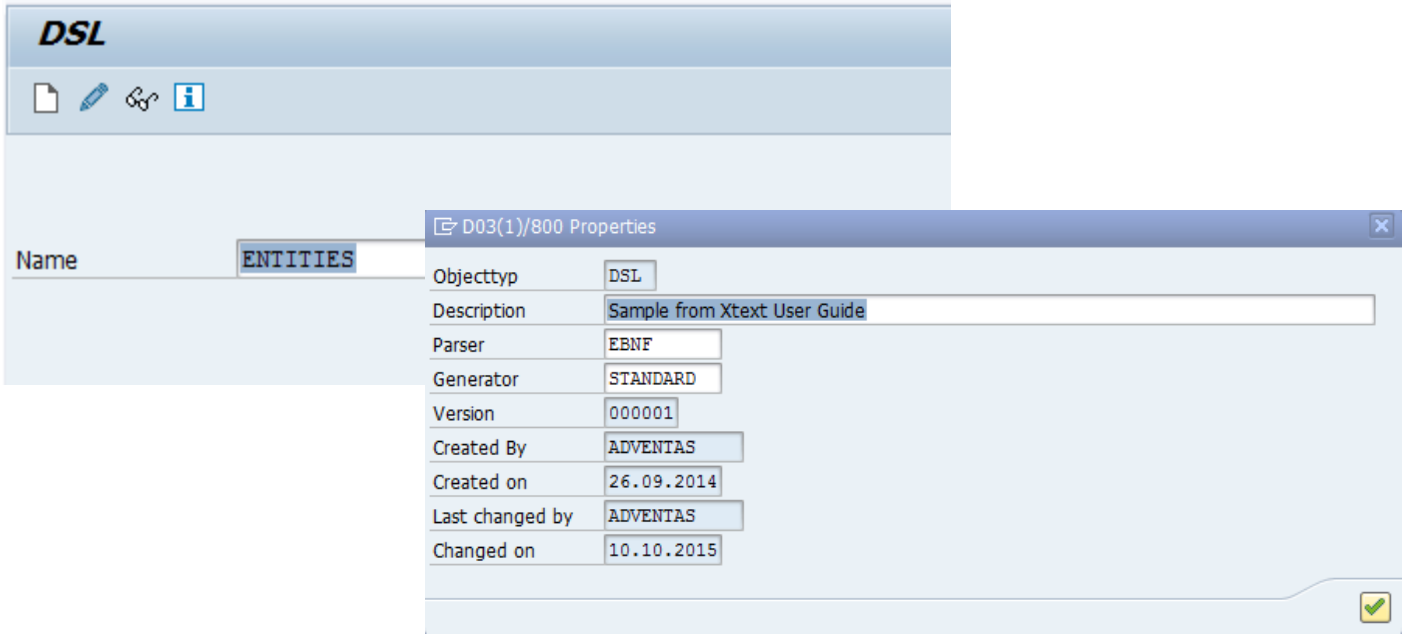
You can use the API of the workbench to call it from your own programs

```
REPORT  /adw/api_sample.

DATA workbench_api TYPE REF TO /adw/cl_api.

PARAMETERS:
   model TYPE /adw/objdir-name MEMORY ID /adw/mmd OBLIGATORY.

INITIALIZATION.
  CREATE OBJECT workbench_api.

START-OF-SELECTION.
  DATA msg TYPE REF TO /adw/cx_adw.

  TRY.
      workbench_api->run( model ).
    CATCH /adw/cx_adw INTO  msg.
      MESSAGE msg TYPE 'S'.
  ENDTRY.
```



- The input and output data is controlled by the generator class
- DSL or model can be provided during run time

First you have to create a DSL by referring to an EBNF.



- You enter a name of the DSL
- You put in a description and
- You choose a definition language / parser
- You choose a generator – STANDARD first and later the generator you have implemented for the DSL you defined.

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To define the DSL you use an extended EBNF.

DSL: Sample from Xtext User Guide

```
1   * Sample from Xtext User Guide, p. 5
2
3   DomainModel = {Type}.
4
5   Type = DataType | Entity.
6
7   DataType = "datatype" name=DTEL.
8
9   Entity = "entity" name=ID ["extends" superType=[Entity]] "{" {Feature} "}".
10
11  Feature = name=ID ":" TypeRef.
12
13  TypeRef = referenced=[Type] [multi?="*"].
```

EBNF:
{ x } – Optional Repetition
x | y – Alternativ
[x] – Option
„x“ – Terminal Symbol
x – Non Terminal Symbol

The extensions are:

- *superType* - inheritance, *referenced* – cross-reference und *multi* - multiplicity as in xtext
- You can refer to DDIC types e.g. like *name=DTEL*
- Character strings of fixed or variable length are supported e.g.*name=c(4)* or *name =STRING* as well as digits e.g. *name=d(4)*.

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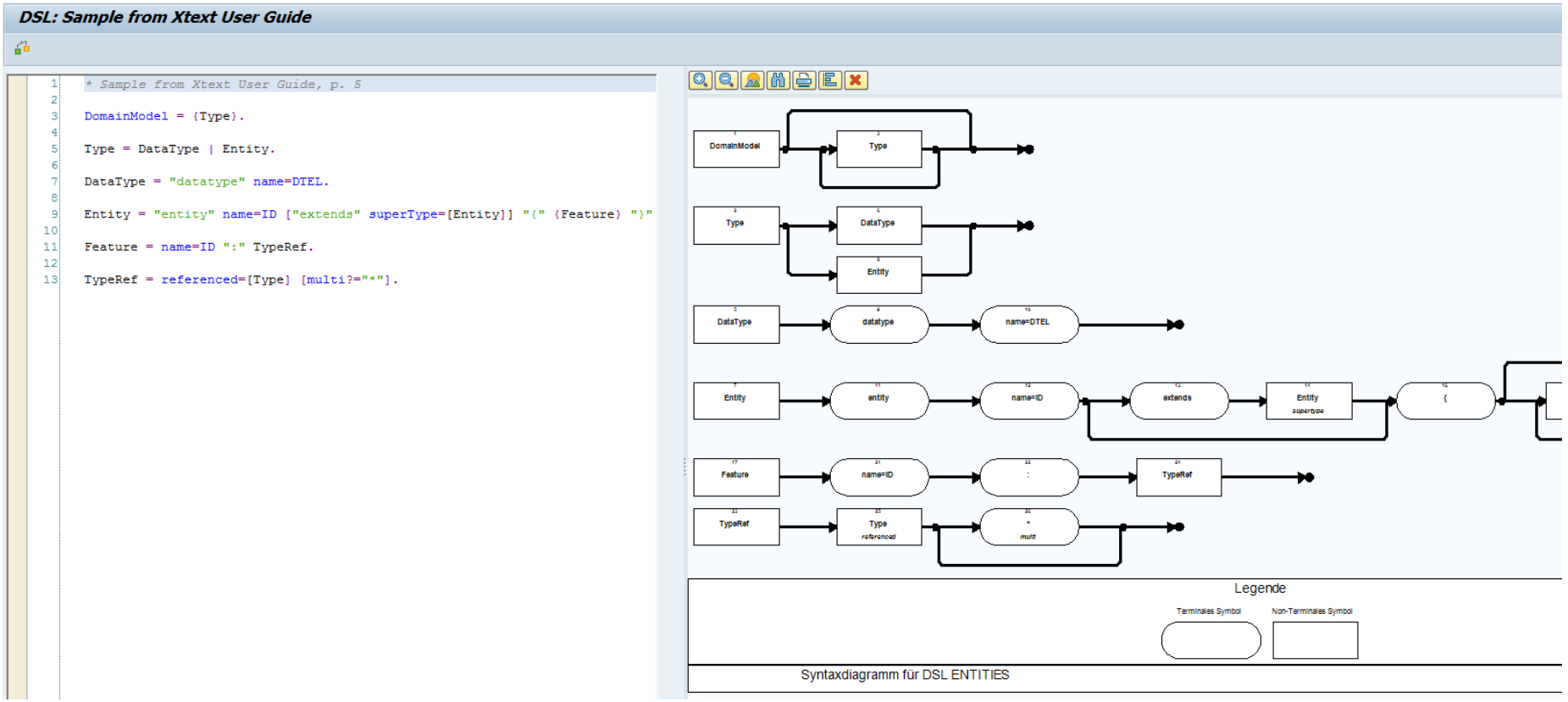
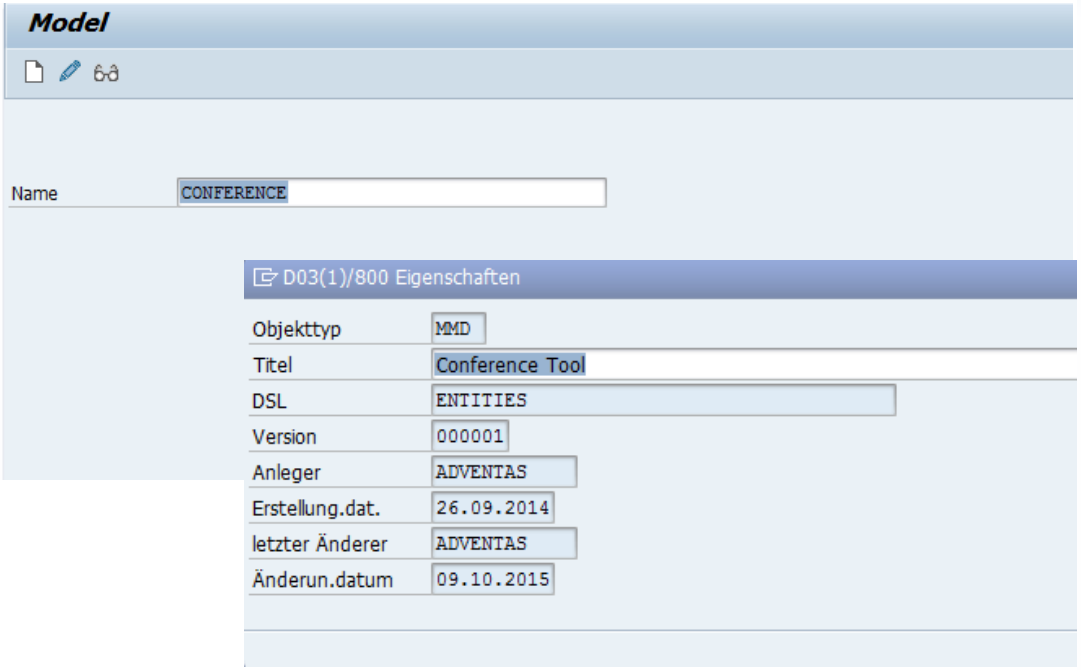
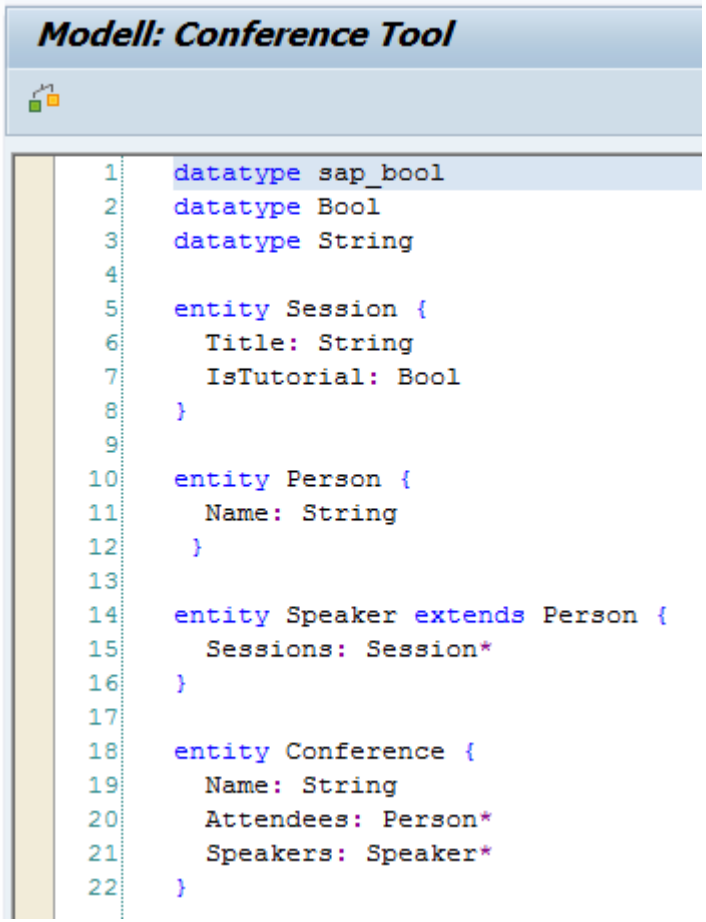
After the syntax check the syntax diagram is shown. It helps you to develop the DSL.



In another transaction you can use the DSL .





- Enter a description
- Choose the DSL the model refers to
- Start modelling

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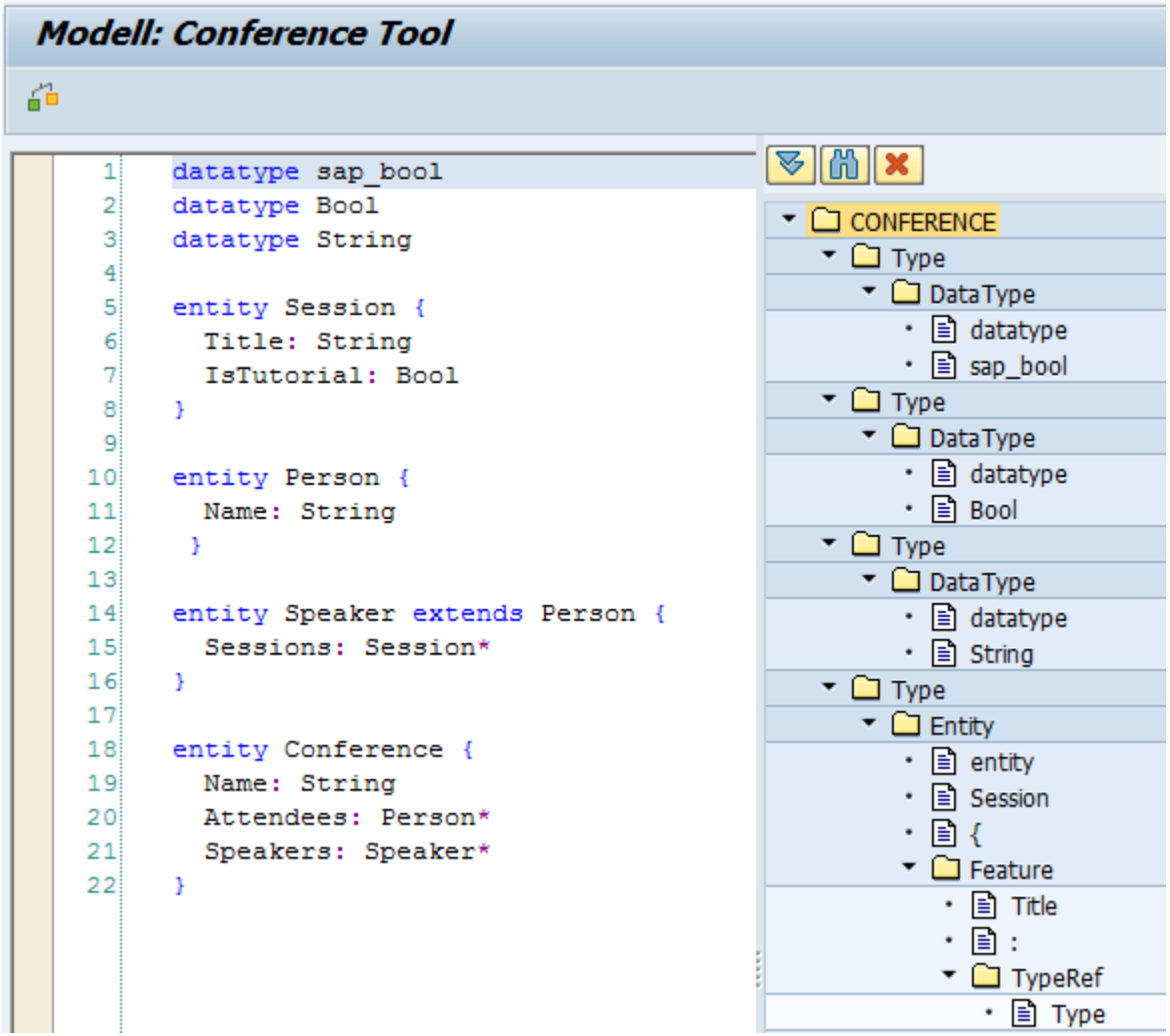
During syntax check the syntax tree is build and shown afterwards to the user.



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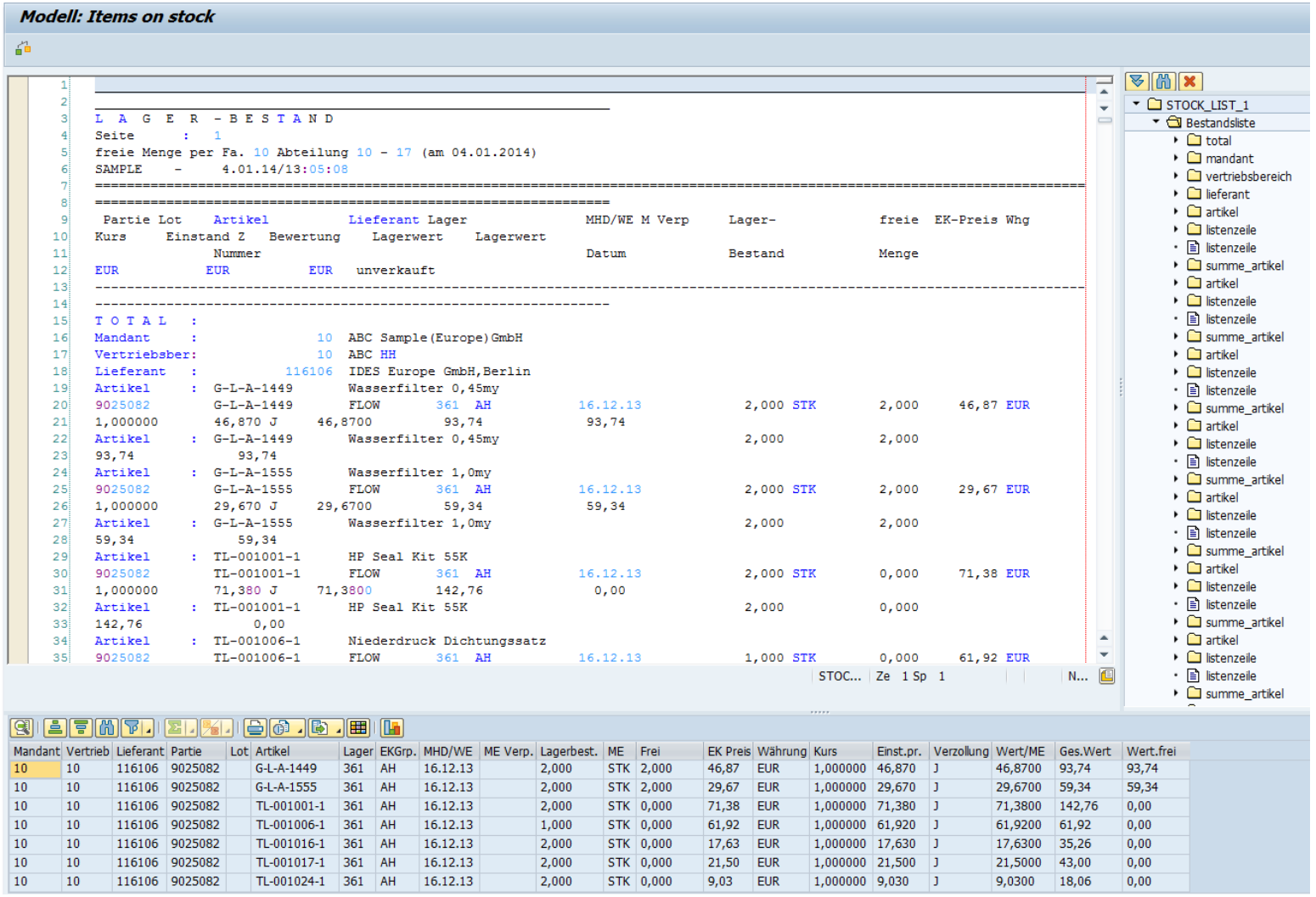
Example 2 – Converting a stock list



Mandant	Vertrieb	Lieferant	Partie	Lot	Artikel	Lager	EKGrp.	MHD/WE	ME Verp.	Lagerbest.	ME	Frei	EK Preis	Währung	Kurs	Einst.pr.	Verzollung	Wert/ME	Ges.Wert	Wert.frei
10	10	116106	9025082		G-L-A-1449	361	AH	16.12.13		2,000	STK	2,000	46,87	EUR	1,000000	46,870	J	46,8700	93,74	93,74
10	10	116106	9025082		G-L-A-1555	361	AH	16.12.13		2,000	STK	2,000	29,67	EUR	1,000000	29,670	J	29,6700	59,34	59,34
10	10	116106	9025082		TL-001001-1	361	AH	16.12.13		2,000	STK	0,000	71,38	EUR	1,000000	71,380	J	71,3800	142,76	0,00
10	10	116106	9025082		TL-001006-1	361	AH	16.12.13		1,000	STK	0,000	61,92	EUR	1,000000	61,920	J	61,9200	61,92	0,00
10	10	116106	9025082		TL-001016-1	361	AH	16.12.13		2,000	STK	0,000	17,63	EUR	1,000000	17,630	J	17,6300	35,26	0,00
10	10	116106	9025082		TL-001017-1	361	AH	16.12.13		2,000	STK	0,000	21,50	EUR	1,000000	21,500	J	21,5000	43,00	0,00
10	10	116106	9025082		TL-001024-1	361	AH	16.12.13		2,000	STK	0,000	9,03	EUR	1,000000	9,030	J	9,0300	18,06	0,00

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Example 2 – Defining the elements of a stock list

```
DomainModel = Bestandsliste.

* Fields in the list
Mandant             = name=c(2).
Mandantenname       = name=c(22).
Vertriebsbereich    = name=c(20).
VBNR                = name=c(2).
Lieferantenname     = name=c(30).
Artikeltext         = name=c(30).
ARTNR               = name=c(14).
LFNR                = name=c(6).
Partie_Lot          = name=d(11).
Lieferantenkurzname = name=c(10).
Lager               = name=c(3).
EK_Gruppe           = "AH" | "90" | "AB" | "HH" | "54" | "EHM54" | "KW_52" | "BF_54" | "ML_54" | "AH_24" |
                      "52" | "JPK52" | "24" | "DS" | "KW" | "KP" | "MP" | "BF" | "WOE54" | "AH_90" | "AH_GMA" |
                      "25" | "EMH25" | "EHM25" | "EMH56" | "EHM56" | "MAP51" | "MAP" | "HH" | "ML" | "TM" | "CF" | "SH" |
                      "MBS" | "JPK24" | "WRE54" | "AB_90" | "DS_57" | "DS_24" | "KW_54" | "MP_54" | "KP_54" | "TM_25" |
                      "SH_57" | "MAP57" | "HH_57" | "CF_80" | "SJ_54" | "80" | "HH_54" | "EHM" | "MAP54" | "CF_57".
MHD_WE              = name=c(8).
m_verp              = "MT" | "KG" | "STK" | "LTR" | "1SP" | "2BB" | "1BS" | "2SP" | "BU" | "1BB" | "SAP".
Gewichtseinheit     = name=c(2).
EK_Preis            = name=STRING.
Whr                 = "EUR" | "USD" | "UDD" | "DEM" | "AUD" | "GBP".
Kurs                = name=c(8).
Einstandspreis      = name=STRING.
Verzollung          = name=c(1).
Bewertung           = name=STRING.
Lagerwert_je_me     = name=STRING.
Lagerbestand        = name=STRING.
freie_menge         = name=STRING.
Lagerwert_gesamt    = name=STRING.
Lagerwert_freie     = name=STRING.
ME                  = "MT" | "KG" | "STK" | "LTR" | "MTR".
```

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Example 2 – Defining the structure of a stock list

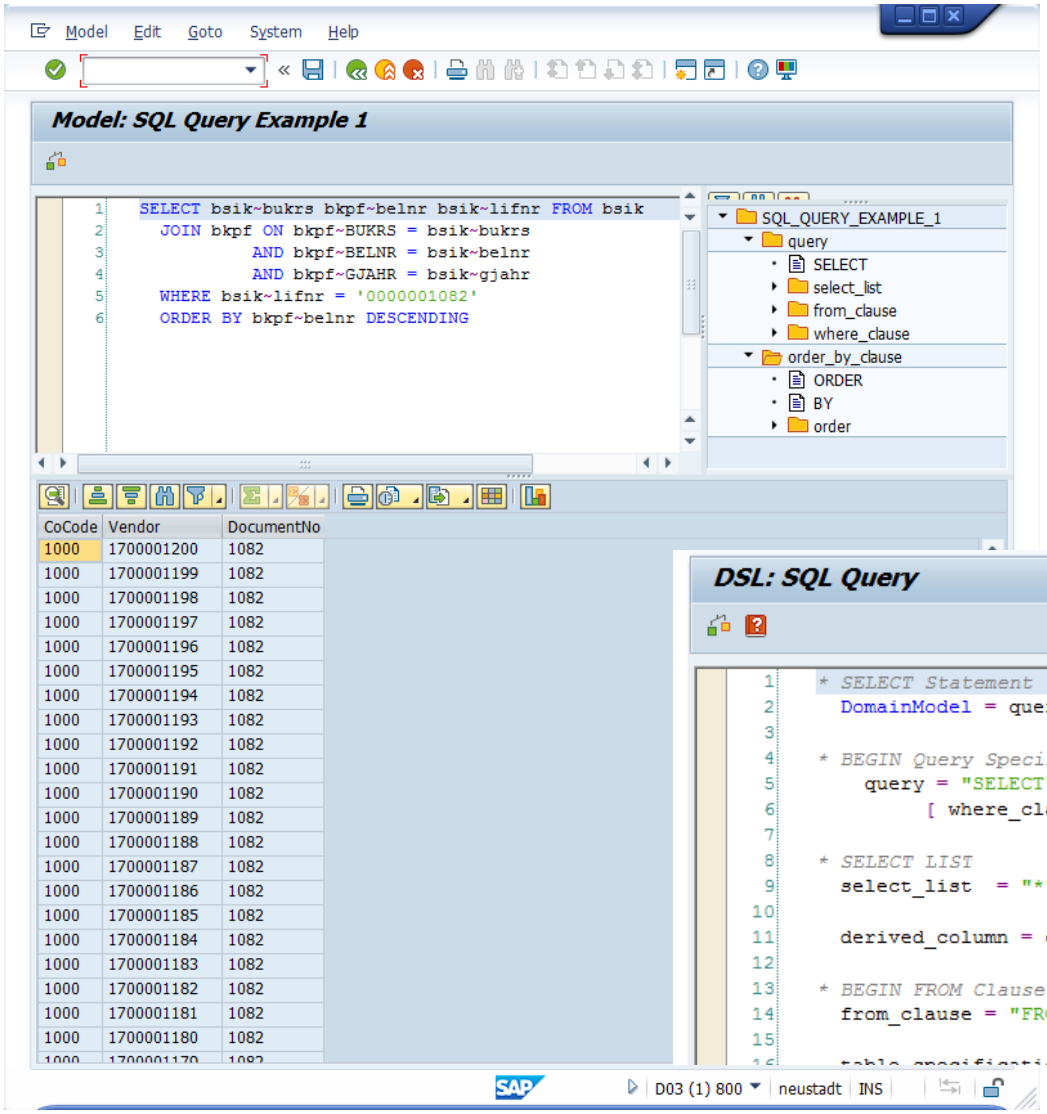
```
* line of the list
listenzeile           = Partie_Lot ARTNR Lieferantenkurzname Lager [EK_Gruppe] MHD_WE [m_verp] Lagerbestand [ME]
                        freie_menge EK_Preis [Whr] Kurs Einstandspreis Verzollung
                        Lagerwert_je_me Lagerwert_gesamt Lagerwert_freie.

* Summ
summe_artikel          = "Artikel"      ":" ARTNR Artikeltext Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.
summe_lieferant        = "Lieferant"    ":" LFNR Lieferantenname Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.
summe_vertriebsbereich = "Vertriebsber" ":" VBNR Vertriebsbereich Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.
summe_mandant          = "Mandant"      ":" Mandant Mandantenname Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.
gesamt_summe           = Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.
gesamt_gruppen         = "Gesamtsumme über alle Gruppen" ":" Lagerbestand freie_menge Lagerwert_gesamt Lagerwert_freie.

* Headers
total            = "T" "O" "T" "A" "L" ":".
mandant          = "Mandant"      ":" Mandant Mandantenname.
vertriebsbereich = "Vertriebsber" ":" VBNR  Vertriebsbereich.
lieferant        = "Lieferant"    ":" LFNR  Lieferantenname.
artikel          = "Artikel"      ":" ARTNR Artikeltext.

Bestandsliste = { [total] [mandant]
                  { vertriebsbereich
                    { lieferant
                      { artikel
                          listenzeile {listenzeile}
                        summe_artikel
                      }
                      summe_lieferant
                    }
                    summe_vertriebsbereich
                  }
                 [summe_mandant]
                }.
```

Example 3 – A SQL QUERY



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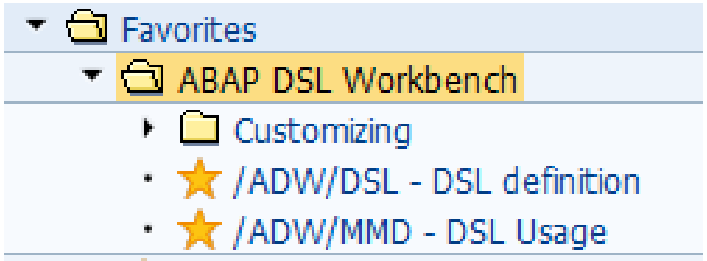
The ABAP DSL Workbench is a toolset, which allows you to define and execute your own DSLs.



The ABAP DSL Workbench has the following components:

- A scanner and parser to define a Domain-Specific Language
- A scanner and general parser for to be able to use the defined DSL
- An editor, with keyword highlighter and keyword completion. You can also set breakpoints to debug the parsing regarding a specific line.
- A general code generator which can be used to generate ABAP code and other development objects.
- The workbench itself is written in ABAP based on SAP Netweaver 7.00 and thus integrates very easily into the ABAP Stack. It is available in English und German.

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Why and when should we create a Domain-Specific Language?

"(…) a DSL is a thin veneer over a model, where the model might be a library or framework." (see M. Fowler, "Languages and Semantic Model", p. 16)

- Domain Experts can read the DSL and thus understand what the system thinks it's doing.
- Change in Execution Context – The same DSL could be used in an ABAP Context as well as in an Java Context.
- Alternative Computational Model – Declarative programming instead of imperative programming.
- (see M. Fowler, "Domain-Specific Languages", p. 33f.)
- Improvement of Development Productivity - Reduce manual typing by generating infrastructural code, hide a complex API.

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Thank you for your attention! Questions?

If you want the slides or if you want to try out the workbench please contact me directly.

Please don’t forget to fill out the Feedback!

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