

2. Workshop

Reengineering Prozesse

Chemnitz, 7 Okt. 2005

**Werkzeuggestützter Migrationsprozess für die
Überführung prozeduraler Programme in eine
objektorientierte Architektur**

von

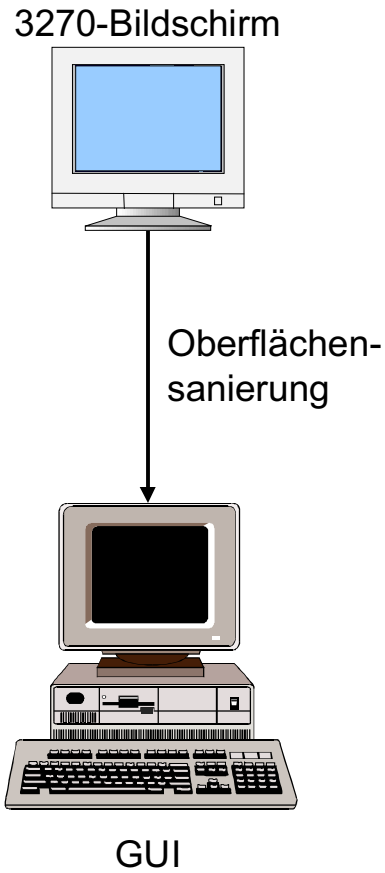
Harry M. Sneed

Universitäten Regensburg & Passau

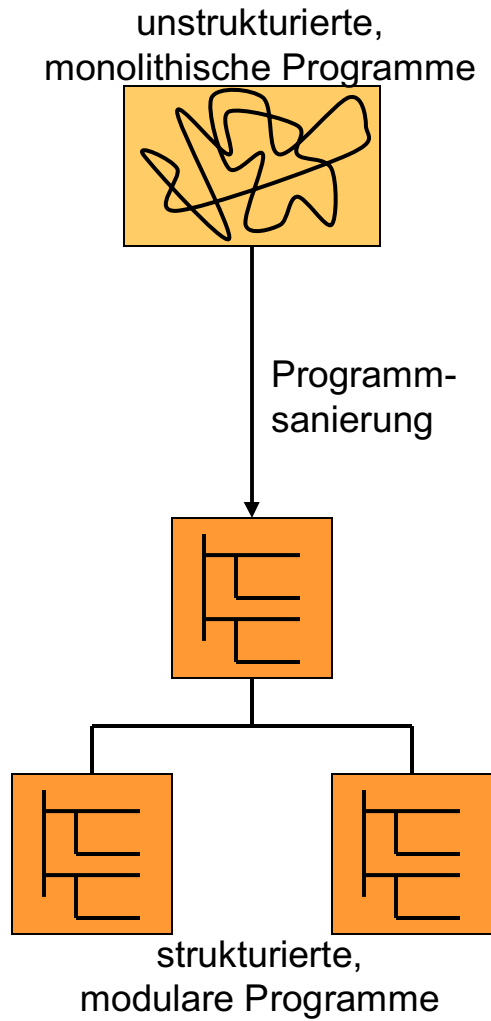
AneCon GmbH, Wien

Erst sanieren, dann transformieren

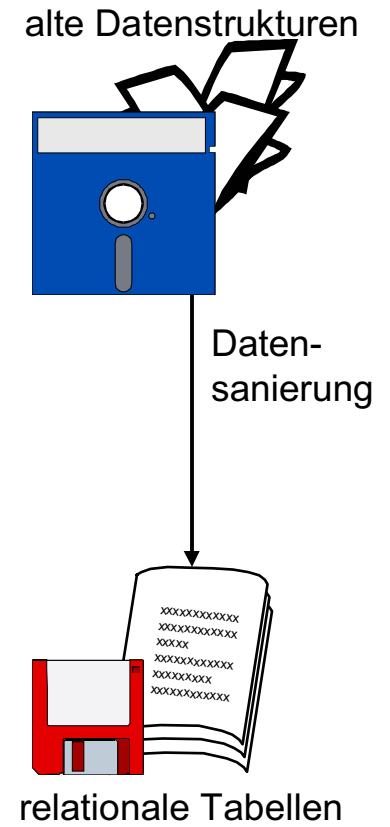
Oberflächensanierung



Programmsanierung

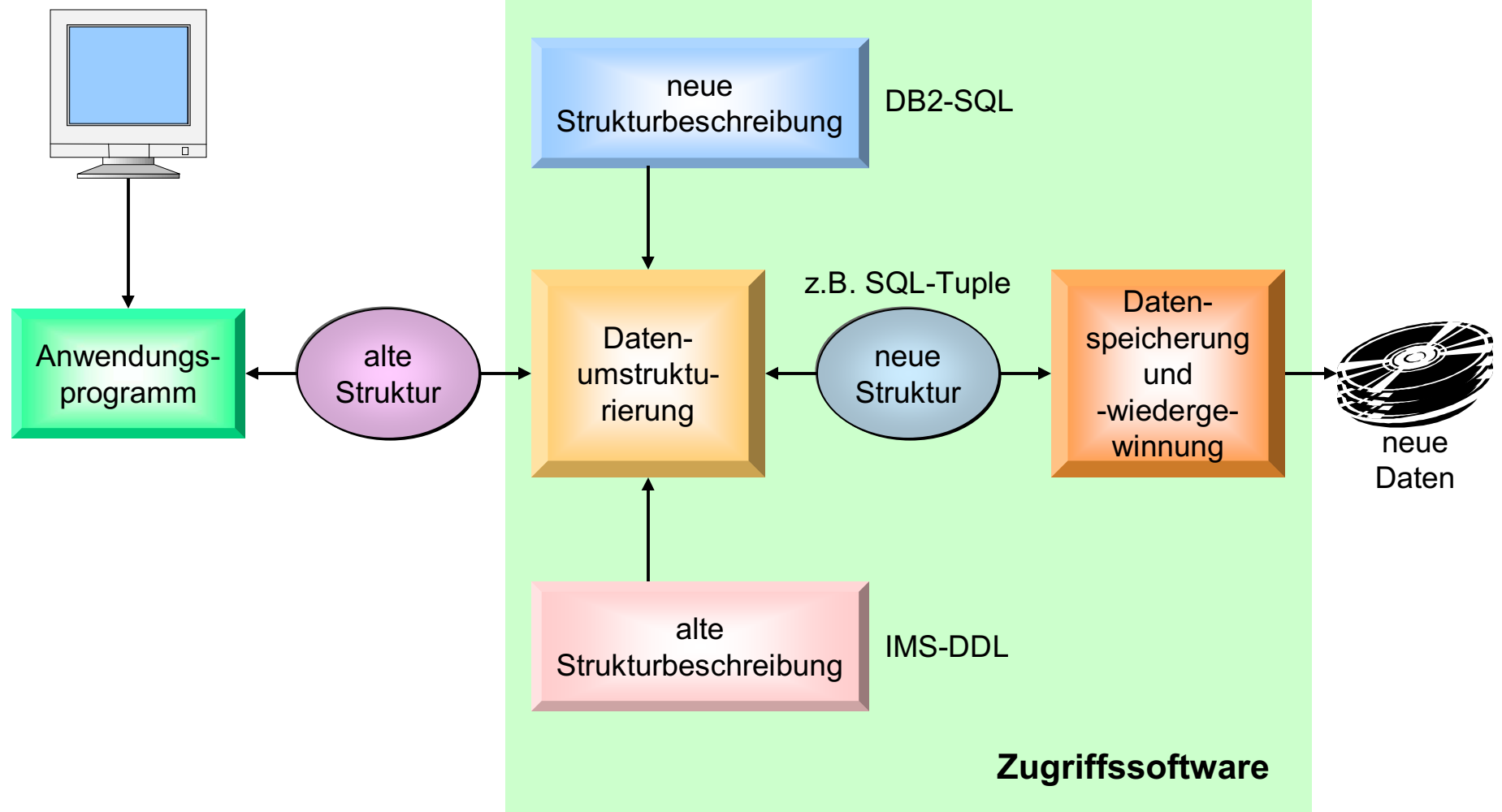


Datenbanksanierung

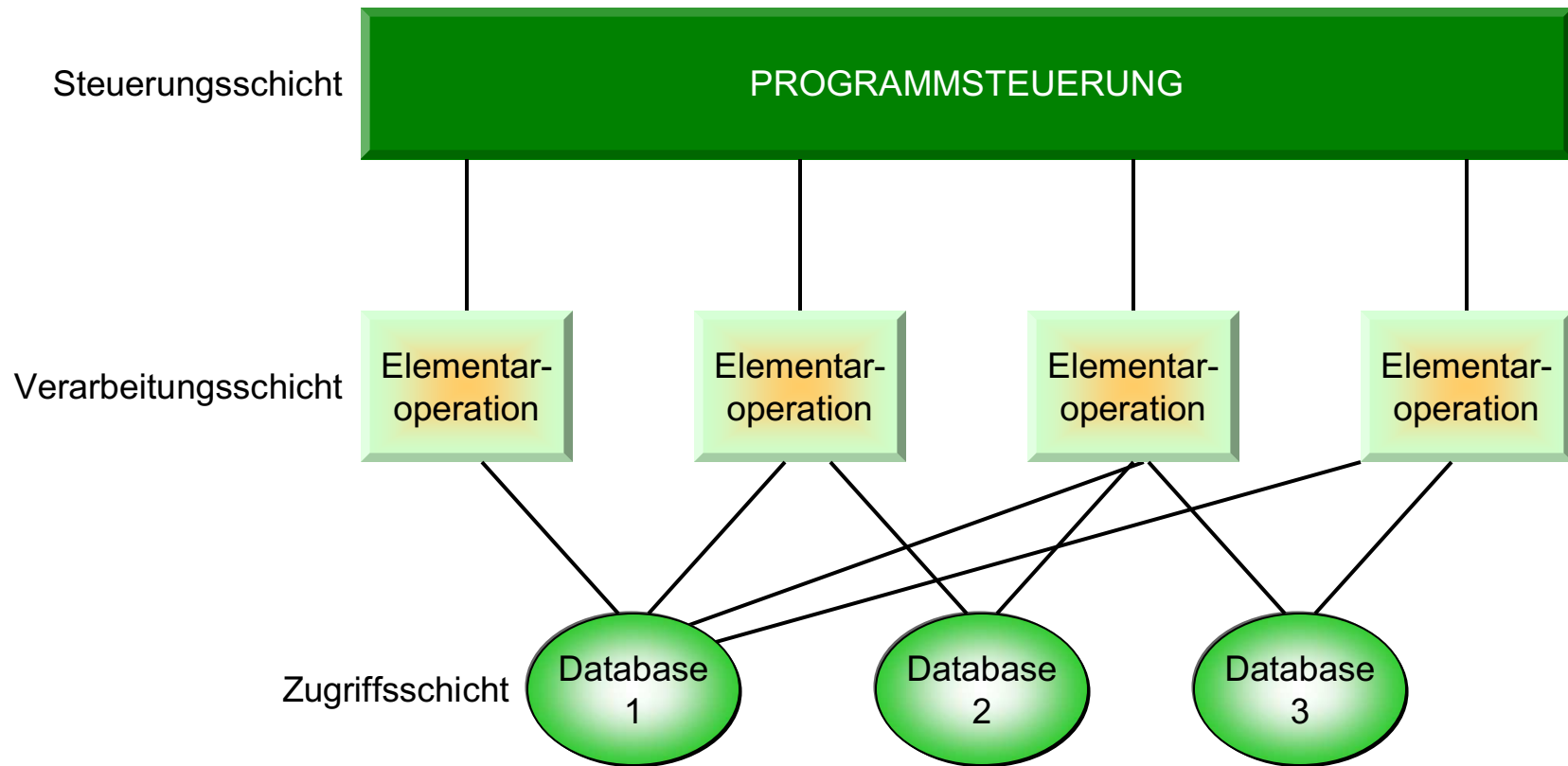


Erstellung einer Zugriffsschale

Benutzeroberfläche

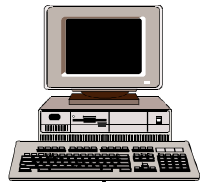


Dreischichtige Programmarchitektur

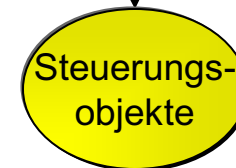
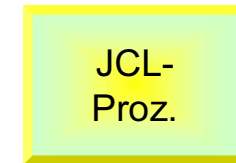


Ableitung von Objekten aus prozeduralen Systemen

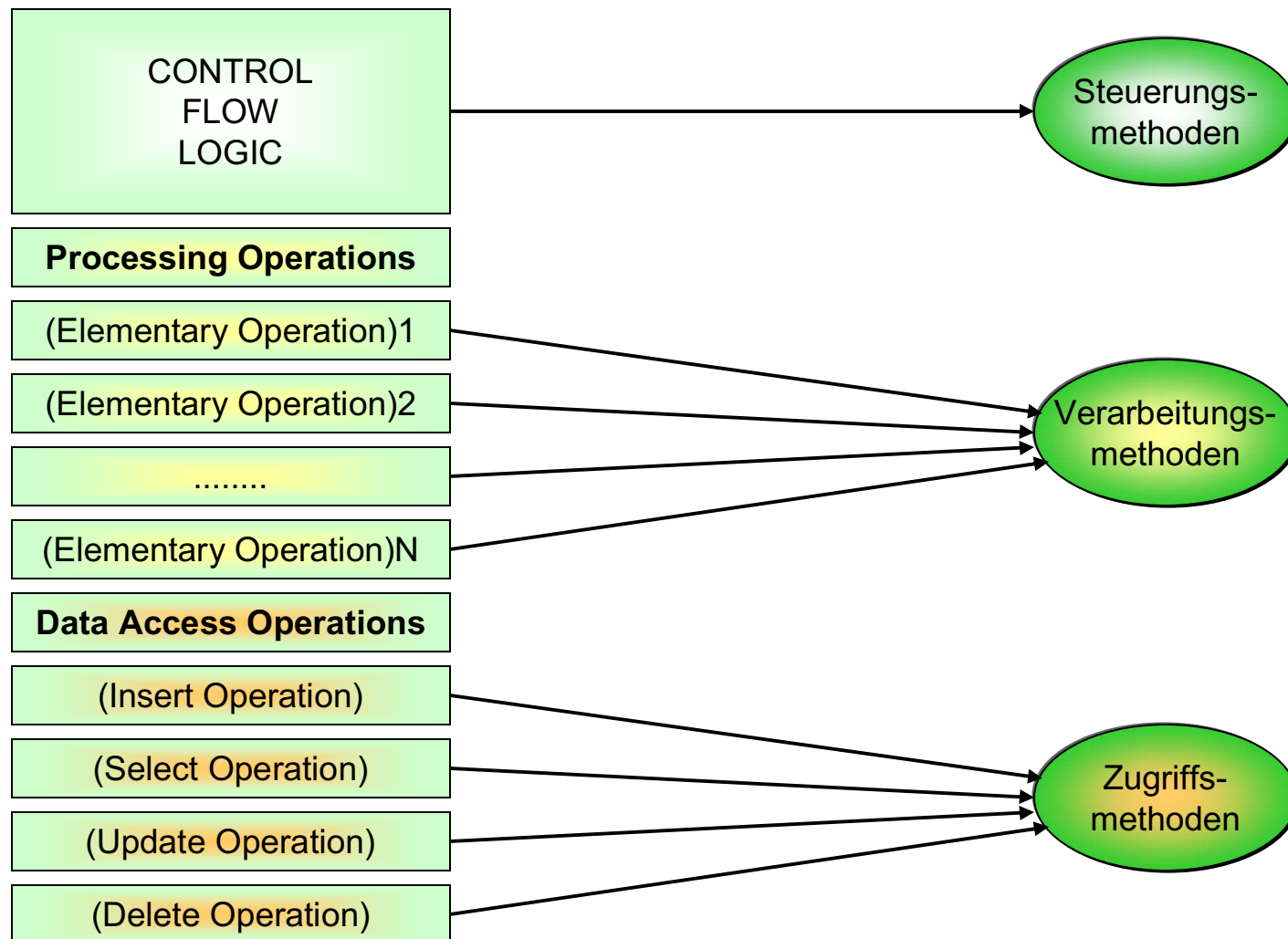
Benutzermasken



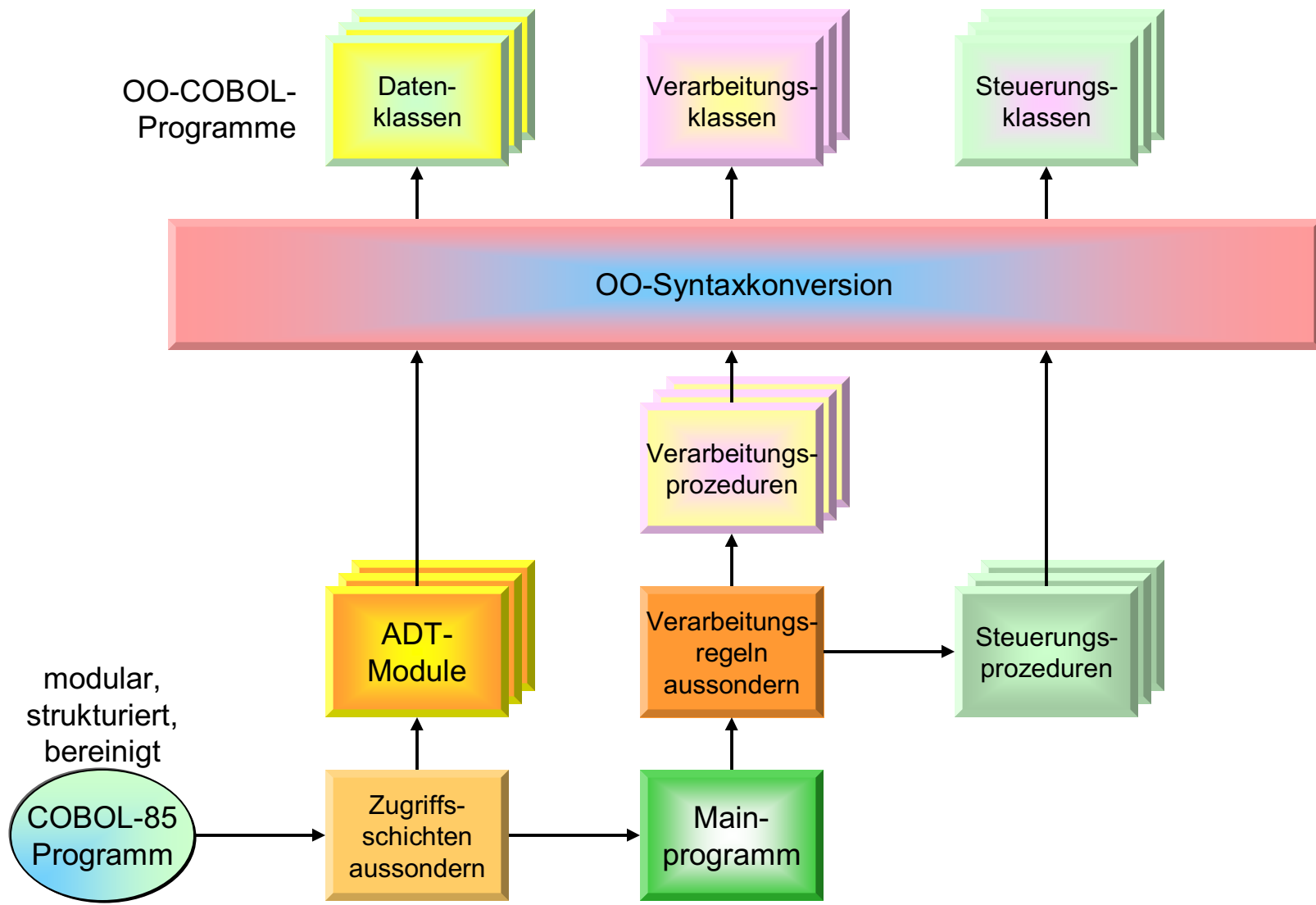
Datenbanken



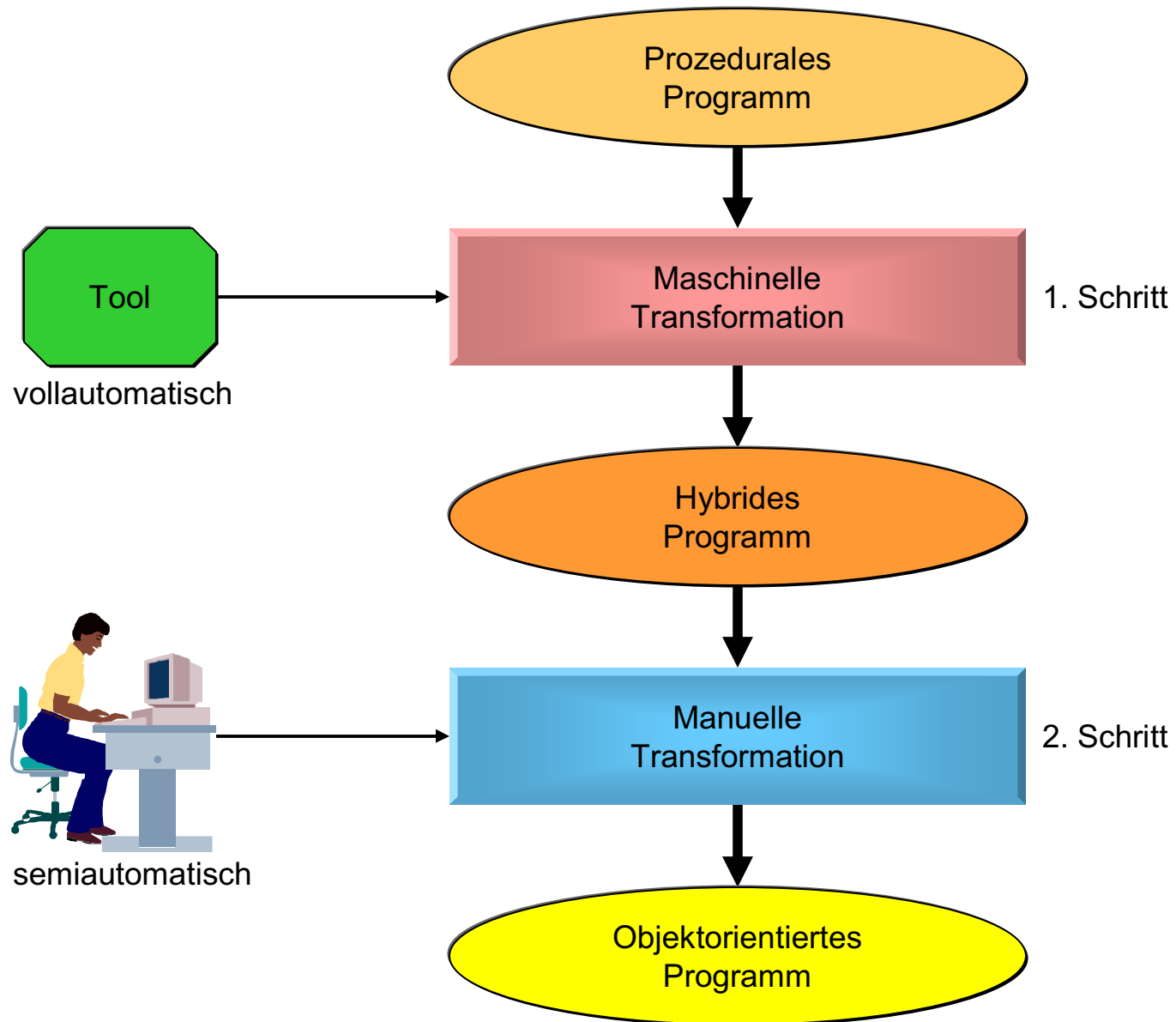
Ableitung der Methoden aus einem prozeduralen Programm



COBTRANS-Programmtransformationsverfahren



Programmtransformation in zwei Schritten



OMIG

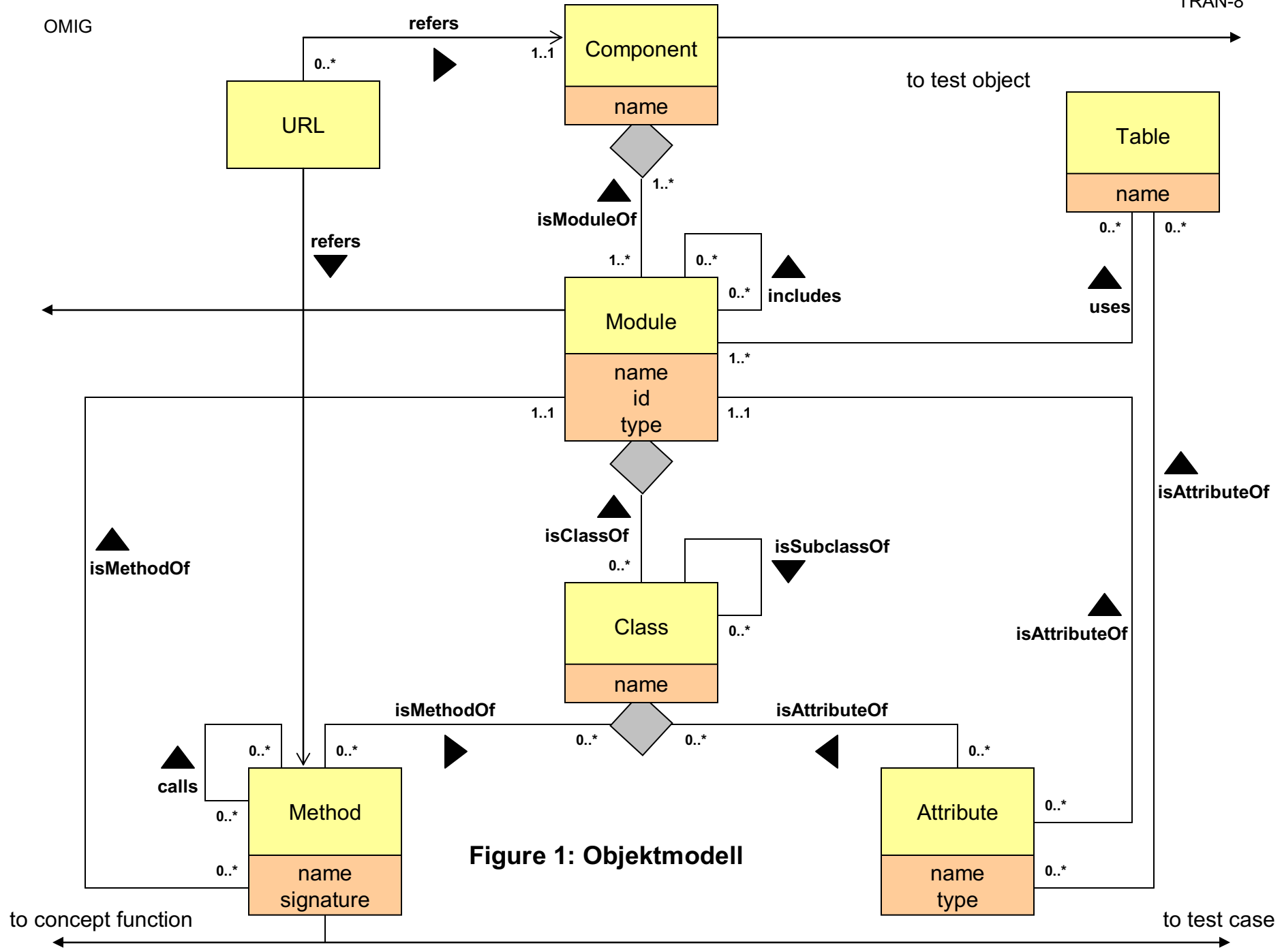


Figure 1: Objektmodell

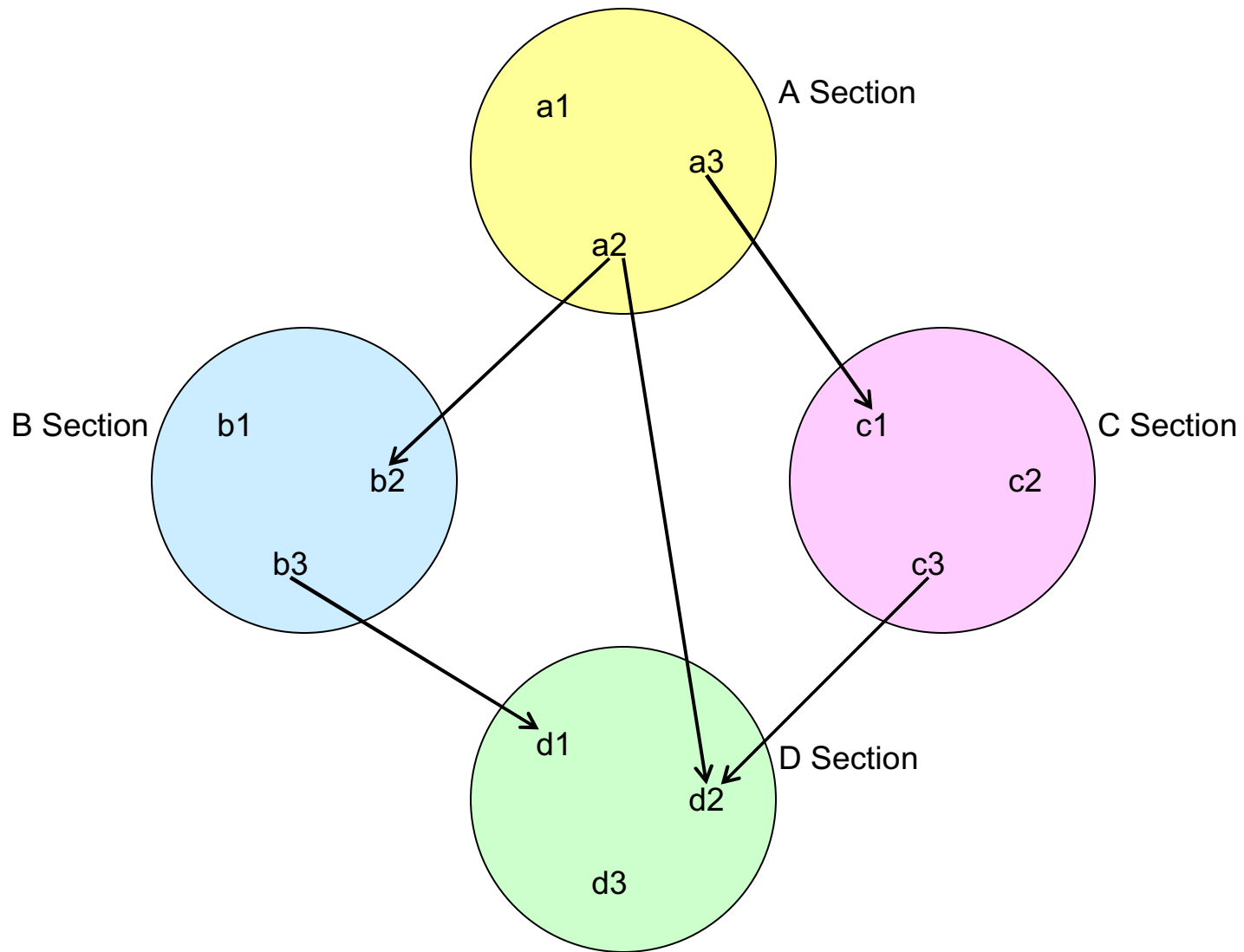


Fig. 2: Procedural Interdependence Graph = Prozedurhierarchie

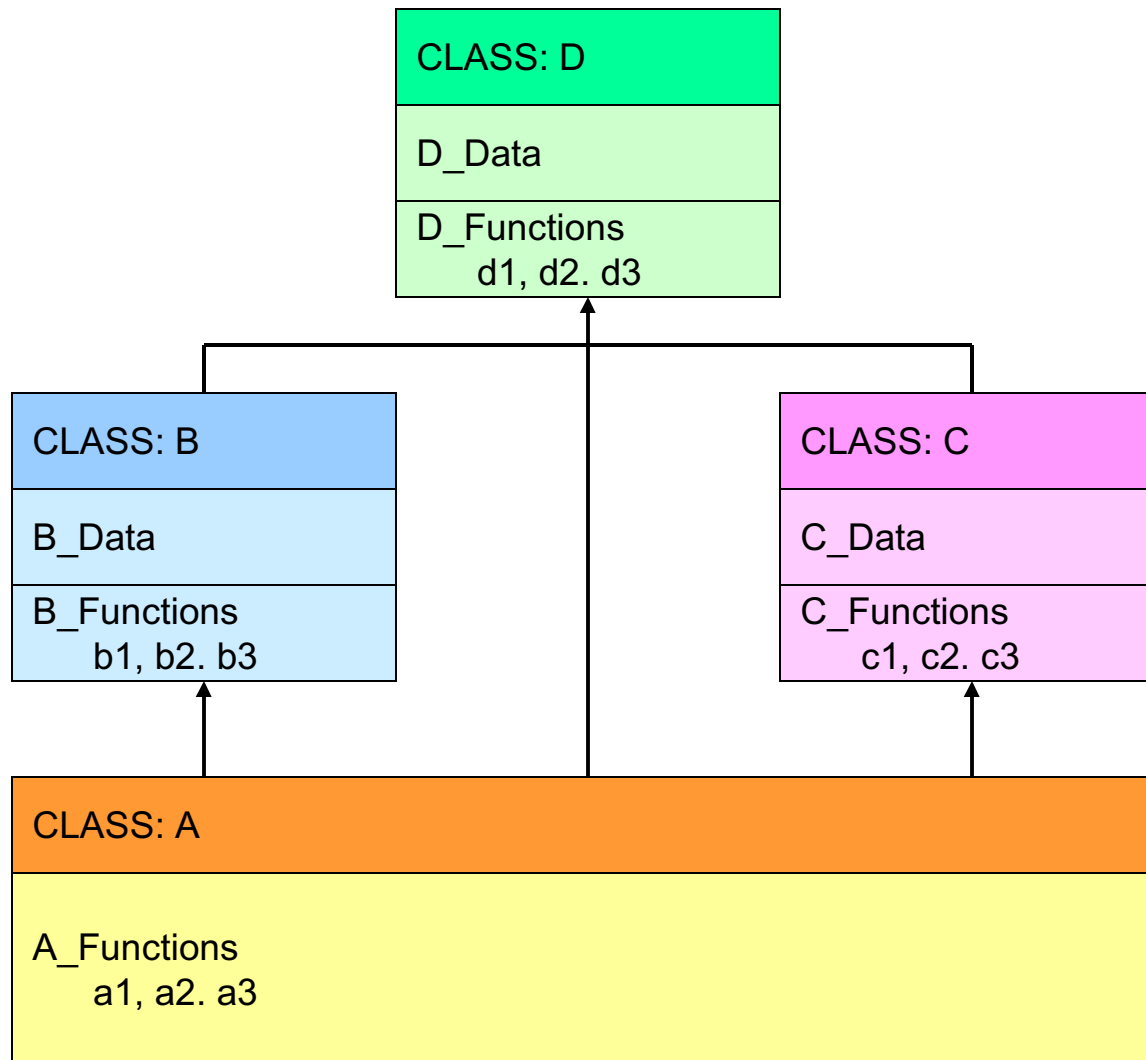


Fig. 3: Invertierte Prozedurhierarchie = Klassenhierarchie

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Type;BaseEntityName                ;Rel ;Type;TargetEntityname
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SECT;PQMC01K_MATCHCODE_VERARBEITUNG ;OWNS;FUNC;PQMC01K_MATCHCODE_VERARBEITUNG
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_E02
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_R01_OPEN310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_G02
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG ;PERF;FUNC;PQMC01K_G02
SECT;PQMC01K_MATCHCODE_VERARBEITUNG ;OWNS;FUNC;PQMC01K_D02990
MOD ;PQMC01K                        ;OWNS;SECT;PQMC01K_E02
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02100
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02200
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02300
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02900
SECT;PQMC01K_E02                    ;OWNS;FUNC;PQMC01K_E02990
MOD ;PQMC01K                        ;OWNS;SECT;PQMC01K_AUSGABE_AUFBEREITUNG
SECT;PQMC01K_AUSGABE_AUFBEREITUNG  ;OWNS;FUNC;PQMC01K_AUSGABE_AUFBEREITUNG
SECT;PQMC01K_AUSGABE_AUFBEREITUNG  ;OWNS;FUNC;PQMC01K_G02
FUNC;PQMC01K_G02                    ;PERF;FUNC;PQMC01K_Q01_WRITEQ
SECT;PQMC01K_AUSGABE_AUFBEREITUNG  ;OWNS;FUNC;PQMC01K_G02800
FUNC;PQMC01K_G02800                ;PERF;FUNC;PQMC01K_Q01_WRITEQ
SECT;PQMC01K_AUSGABE_AUFBEREITUNG  ;OWNS;FUNC;PQMC01K_G02900
FUNC;PQMC01K_G02900                ;PERF;FUNC;PQMC01K_Q01_WRITEQ
SECT;PQMC01K_AUSGABE_AUFBEREITUNG  ;OWNS;FUNC;PQMC01K_G02990
MOD ;PQMC01K                        ;OWNS;SECT;PQMC01K_DATENBANKSCHNITTSTELLE
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_DATENBANKSCHNITTSTELLE
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_DB_INITIALIZIERUNG
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_Q01_WRITEQ
FUNC;PQMC01K_Q01_WRITEQ             ;PERF;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_Q01_WRITEQ             ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_OPEN310
FUNC;PQMC01K_R01_OPEN310           ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_R01_CLOSE310         ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_R01_FETCH310         ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
SECT;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_R01_COUNT             ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
MOD ;PQMC01K                        ;OWNS;SECT;PQMC01K_ERROR_HANDLING
SECT;PQMC01K_ERROR_HANDLING        ;OWNS;FUNC;PQMC01K_YY03_DB2ERROR

```



```

Type;BaseEntityName                ;Rel ;Type;TargetEntityName
MOD ;PQMC01K                        ;OWNS;STRU;PQMC01K
STRU;PQMC01K                        ;OWNS;STRU;IDSS10K
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DOUBLE 9(8)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_PROGN X(8)
STRU;IDSS10K                        ;OWNS;STRU;ISS10_AKTION
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS1 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS2 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS3 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_MITID X(4)
STRU;IDSS10K                        ;OWNS;STRU;ISS10_SYSDAT
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_TT 99
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_K2 X
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_MM 99
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_K2 X
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_JJ34 99
STRU;IDSS10K                        ;OWNS;STRU;ISS10_SYSTEMIM
STRU;ISS10_SYSTEMIM                ;OWNS;DATA;ISS10_STD 99
STRU;ISS10_SYSTEMIM                ;OWNS;DATA;ISS10_DPP X
STRU;ISS10_SYSTEMIM                ;OWNS;DATA;ISS10_MIN 99
STRU;IDSS10K                        ;OWNS;DATA;ISS10_SQLCODE S999
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2TAB X(8)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2OPER X(6)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2NR 99
STRU;PQMC01K                        ;OWNS;STRU;WMC02K
STRU;WMC02K                         ;OWNS;DATA;WMC02_TABCOUNT S9(4)
STRU;WMC02K                         ;OWNS;DATA;WMC02_TABC_NUM S9(4)
STRU;WMC02K                         ;OWNS;DATA;WMC02_COUNT_TAB S9(4)
STRU;WMC02K                         ;OWNS;STRU;TEST_DATA_FIELDS

```

```

Type;BaseEntityName                               ;Rel ;Type;TargetEntityType
MOD ;PQMC01K                                       ;OWNS;CLAS;PQMC01K_MATCHCODE_VERARBEITUNG
CLAS;PQMC01K_MATCHCODE_VERARBEITUNG              ;USES;CLAS;PQMC01K_E02
CLAS;PQMC01K_MATCHCODE_VERARBEITUNG              ;USES;CLAS;PQMC01K_AUSGABE_AUFBEREITUNG
CLAS;PQMC01K_MATCHCODE_VERARBEITUNG              ;USES;CLAS;PQMC01K_DATENBANKSCHNITTSTELLE
CLAS;PQMC01K_MATCHCODE_VERARBEITUNG              ;OWNS;FUNC;PQMC01K_MATCHCODE_VERARBEITUNG
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_E02
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_R01_OPEN310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_G02
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_MATCHCODE_VERARBEITUNG              ;PERF;FUNC;PQMC01K_G02
CLAS;PQMC01K_MATCHCODE_VERARBEITUNG              ;OWNS;FUNC;PQMC01K_D02990
MOD ;PQMC01K                                       ;OWNS;CLAS;PQMC01K_E02
CLAS;PQMC01K_E02                                  ;USES;CLAS;PQMC01K_DATENBANKSCHNITTSTELLE
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02100
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02200
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02300
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02900
CLAS;PQMC01K_E02                                  ;OWNS;FUNC;PQMC01K_E02990
MOD ;PQMC01K                                       ;OWNS;CLAS;PQMC01K_AUSGABE_AUFBEREITUNG
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CLAS;PQMC01K_AUSGABE_AUFBEREITUNG                ;OWNS;FUNC;PQMC01K_AUSGABE_AUFBEREITUNG
CLAS;PQMC01K_AUSGABE_AUFBEREITUNG                ;OWNS;FUNC;PQMC01K_G02
FUNC;PQMC01K_G02                                   ;PERF;FUNC;PQMC01K_Q01_WRITEQ
CLAS;PQMC01K_AUSGABE_AUFBEREITUNG                ;OWNS;FUNC;PQMC01K_G02800
FUNC;PQMC01K_G02800                               ;PERF;FUNC;PQMC01K_Q01_WRITEQ
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FUNC;PQMC01K_G02900                               ;PERF;FUNC;PQMC01K_Q01_WRITEQ
CLAS;PQMC01K_AUSGABE_AUFBEREITUNG                ;OWNS;FUNC;PQMC01K_G02990
MOD ;PQMC01K                                       ;OWNS;CLAS;PQMC01K_DATENBANKSCHNITTSTELLE
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CLAS;PQMC01K_DATENBANKSCHNITTSTELLE              ;OWNS;FUNC;PQMC01K_DB_INITIALIZIERUNG
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE              ;OWNS;FUNC;PQMC01K_Q01_WRITEQ
FUNC;PQMC01K_Q01_WRITEQ                           ;PERF;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_Q01_WRITEQ                           ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE              ;OWNS;FUNC;PQMC01K_R01_OPEN310
FUNC;PQMC01K_R01_OPEN310                          ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
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FUNC;PQMC01K_R01_CLOSE310                         ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE              ;OWNS;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_R01_FETCH310                         ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE              ;OWNS;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_R01_COUNT                            ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
MOD ;PQMC01K                                       ;OWNS;CLAS;PQMC01K_ERROR_HANDLING
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Type;BaseEntityName                ;Rel ;Type;TargetEntityType
MOD ;PQMC01K                        ;OWNS;CLAS;PQMC01K_DATENBANKSCHNITTSTELLE
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;USES;CLAS;PQMC01K_ERROR_HANDLING
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_DATENBANKSCHNITTSTELLE
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_DB_INITIALISIERUNG
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_Q01_WRITEQ
FUNC;PQMC01K_Q01_WRITEQ             ;PERF;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_Q01_WRITEQ             ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_OPEN310
FUNC;PQMC01K_R01_OPEN310           ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_CLOSE310
FUNC;PQMC01K_R01_CLOSE310          ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_FETCH310
FUNC;PQMC01K_R01_FETCH310          ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;FUNC;PQMC01K_R01_COUNT
FUNC;PQMC01K_R01_COUNT             ;PERF;FUNC;PQMC01K_YY03_DB2ERROR
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;STRU;IDSS10K
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DOUBLE 9(8)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_PROGN X(8)
STRU;IDSS10K                        ;OWNS;STRU;ISS10_AKTION
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS1 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS2 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_AKS3 XX
STRU;ISS10_AKTION                   ;OWNS;DATA;ISS10_MITID X(4)
STRU;IDSS10K                        ;OWNS;STRU;ISS10_SYSDAT
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_TT 99
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_K2 X
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_MM 99
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_K2 X
STRU;ISS10_SYSDAT                   ;OWNS;DATA;ISS10_JJ34 99
STRU;IDSS10K                        ;OWNS;STRU;ISS10_SYSTEMIM
STRU;ISS10_SYSTEMIM                 ;OWNS;DATA;ISS10_STD 99
STRU;ISS10_SYSTEMIM                 ;OWNS;DATA;ISS10_DPP X
STRU;ISS10_SYSTEMIM                 ;OWNS;DATA;ISS10_MIN 99
STRU;IDSS10K                        ;OWNS;DATA;ISS10_SQLCODE S999
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2TAB X(8)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2OPER X(6)
STRU;IDSS10K                        ;OWNS;DATA;ISS10_DB2NR 99
CLAS;PQMC01K_DATENBANKSCHNITTSTELLE ;OWNS;STRU;WMC02K
STRU;WMC02K                         ;OWNS;DATA;WMC02_TABCOUNT S9(4)
STRU;WMC02K                         ;OWNS;DATA;WMC02_TABC_NUM S9(4)
STRU;WMC02K                         ;OWNS;DATA;WMC02_COUNT_TAB S9(4)
STRU;WMC02K                         ;OWNS;STRU;TEST_DATA_FIELDS

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Control Section

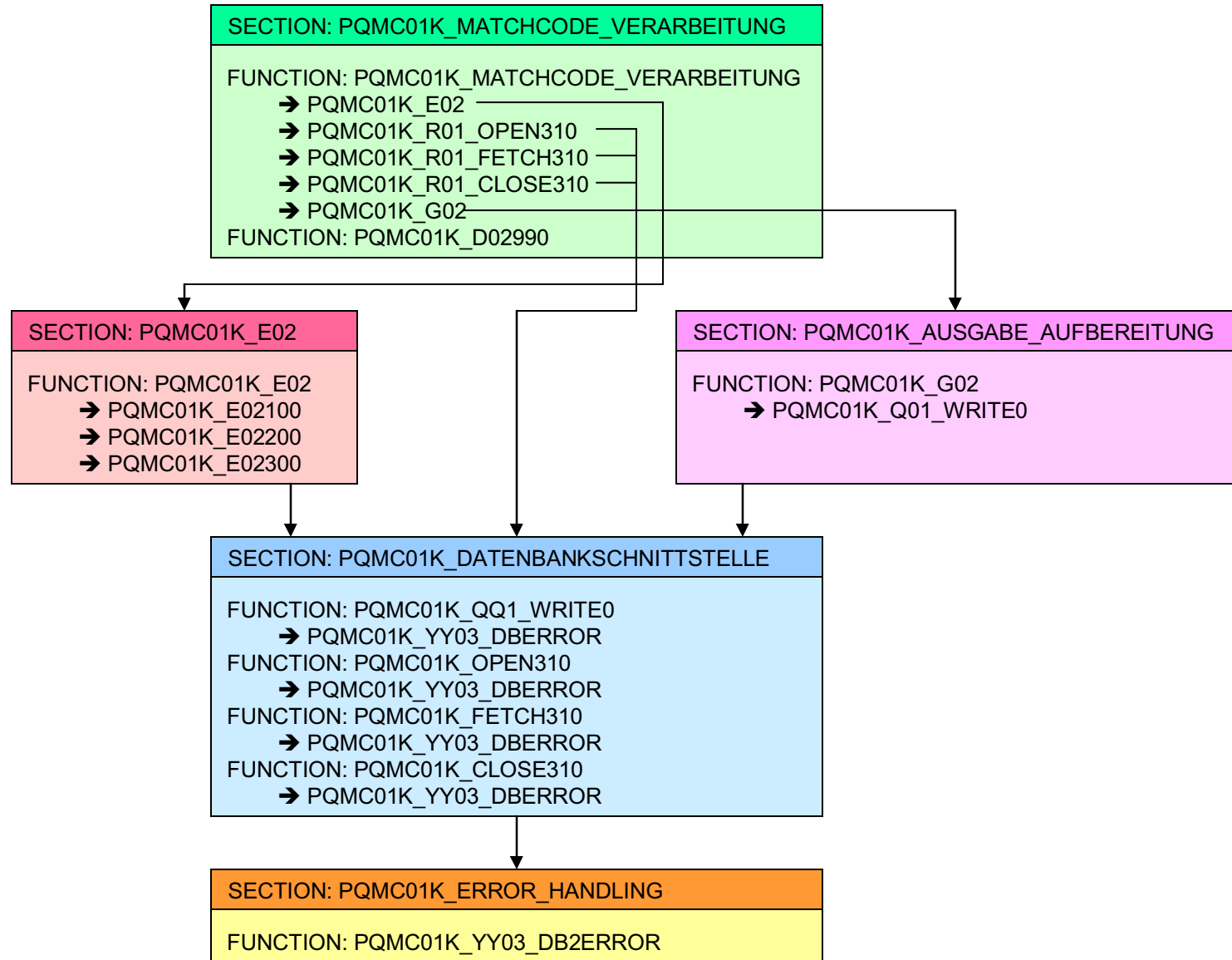


Fig. 4: Originale Prozedurstruktur

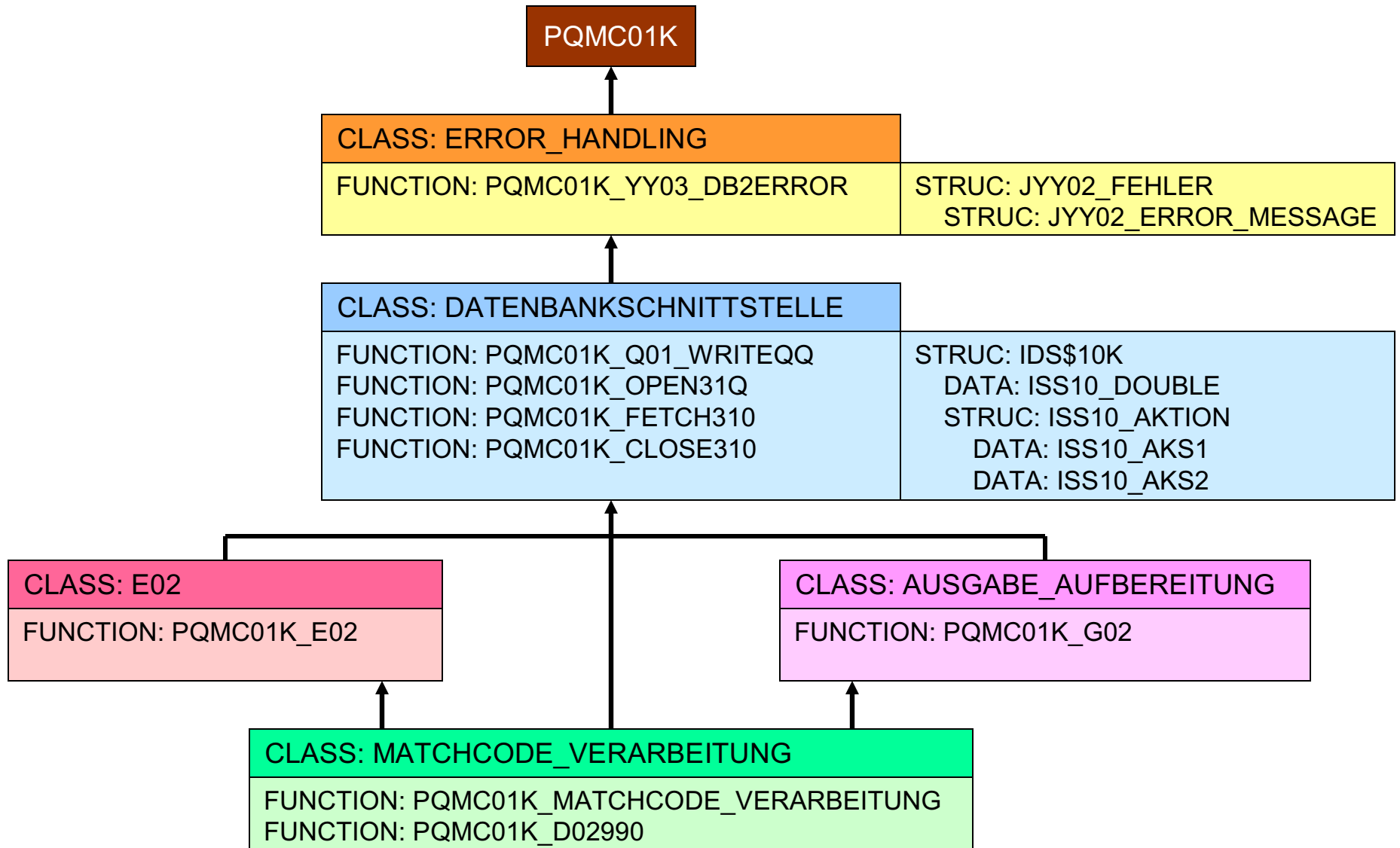


Fig. 5: Abgeleitete Klassenstruktur

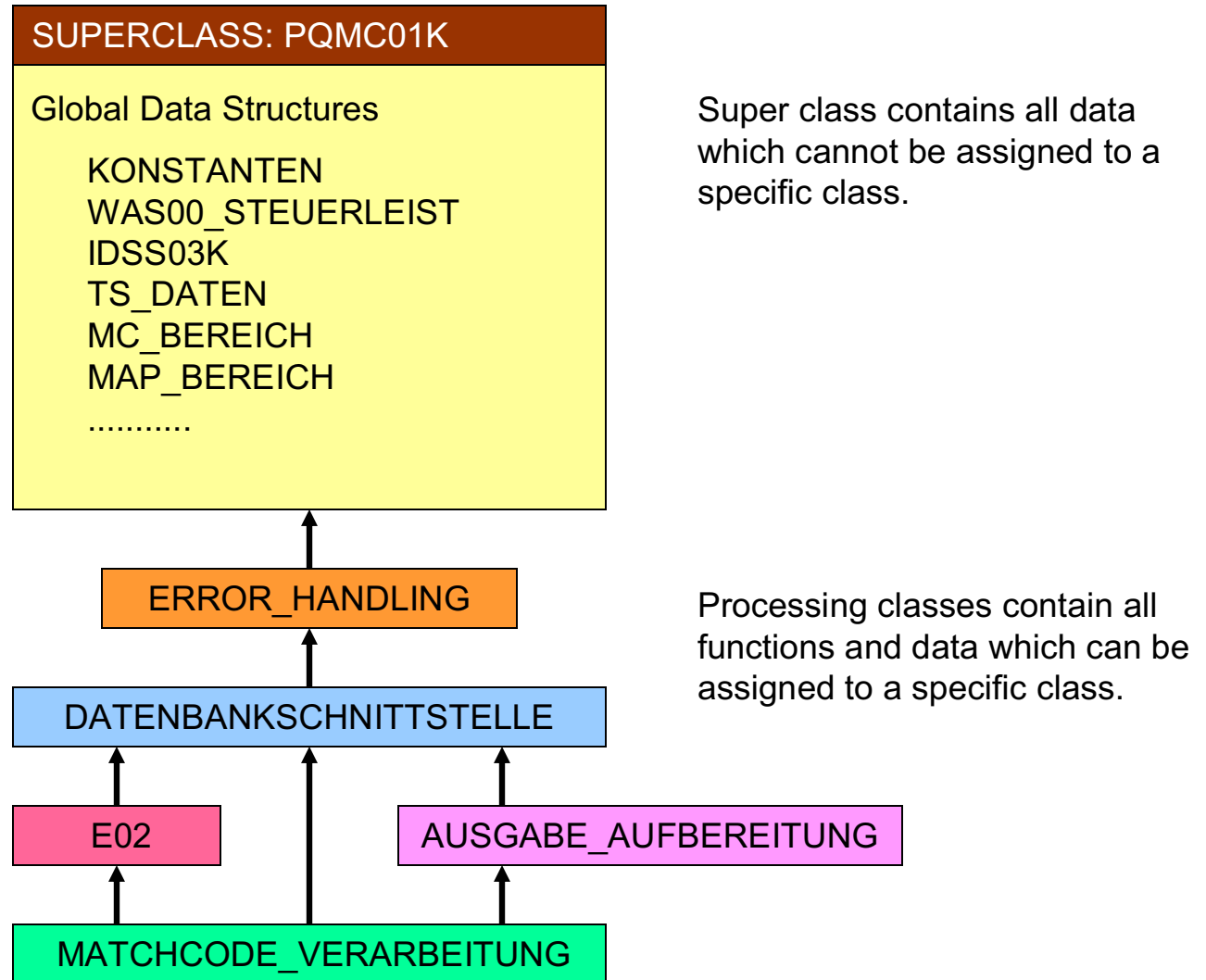
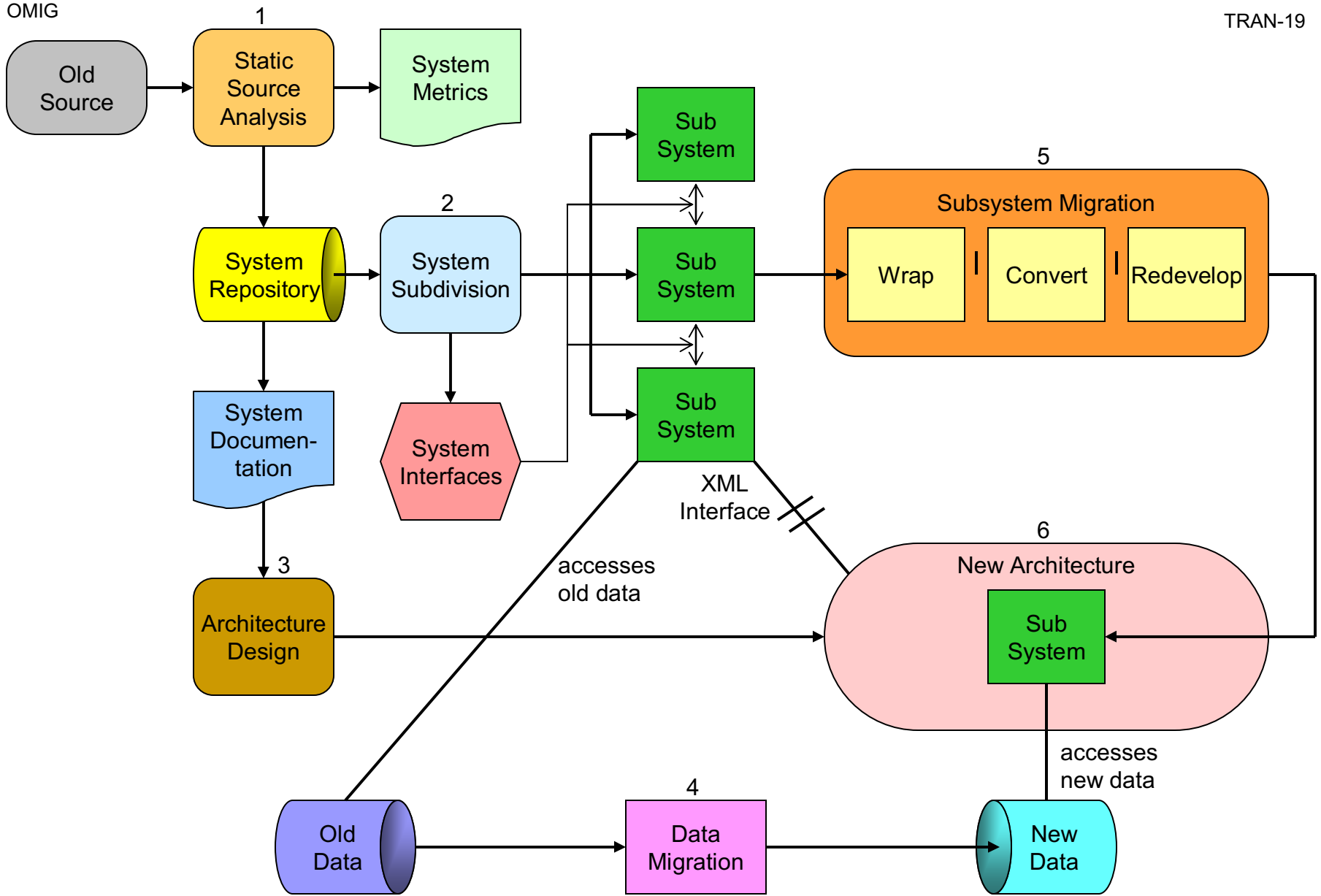
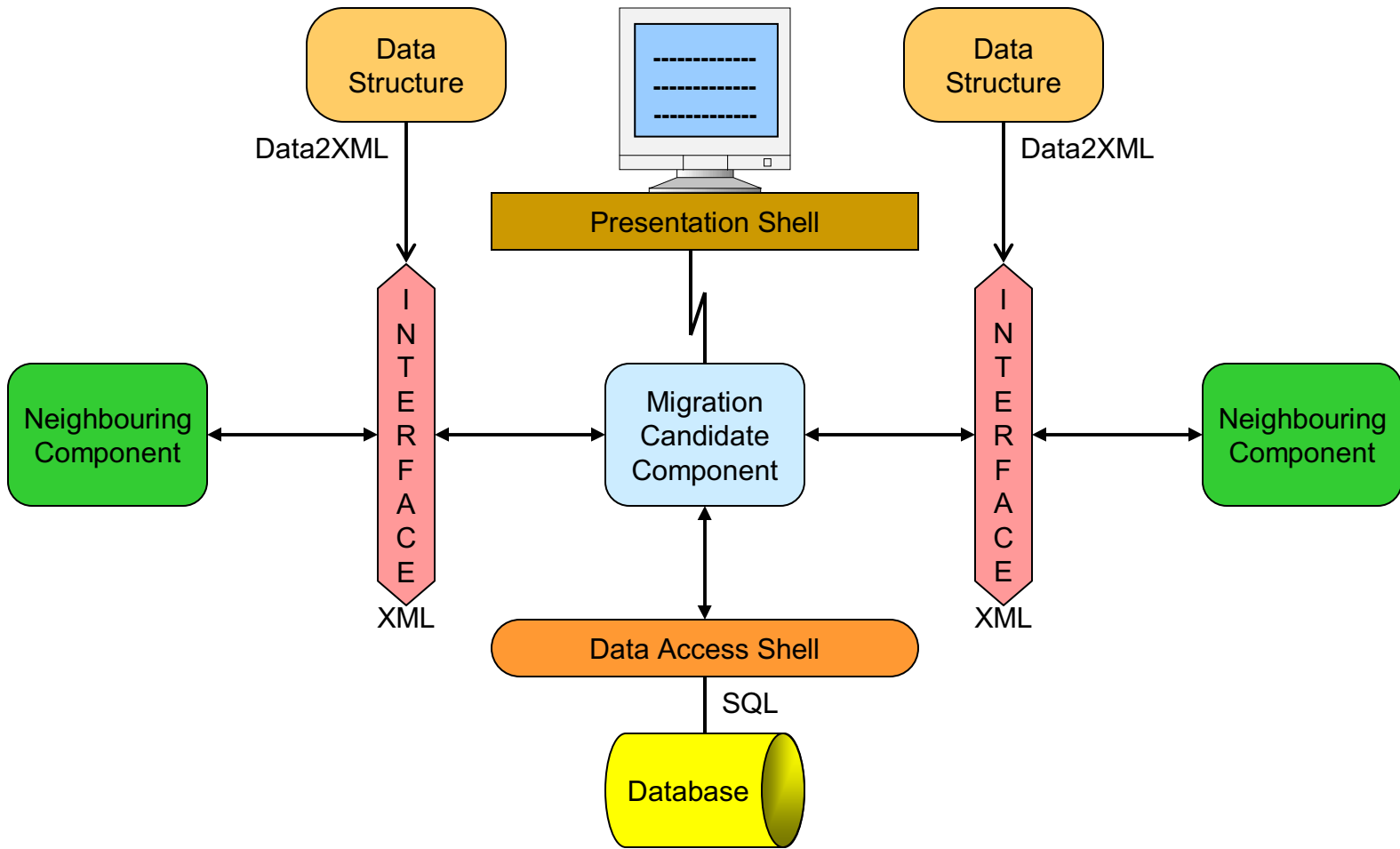


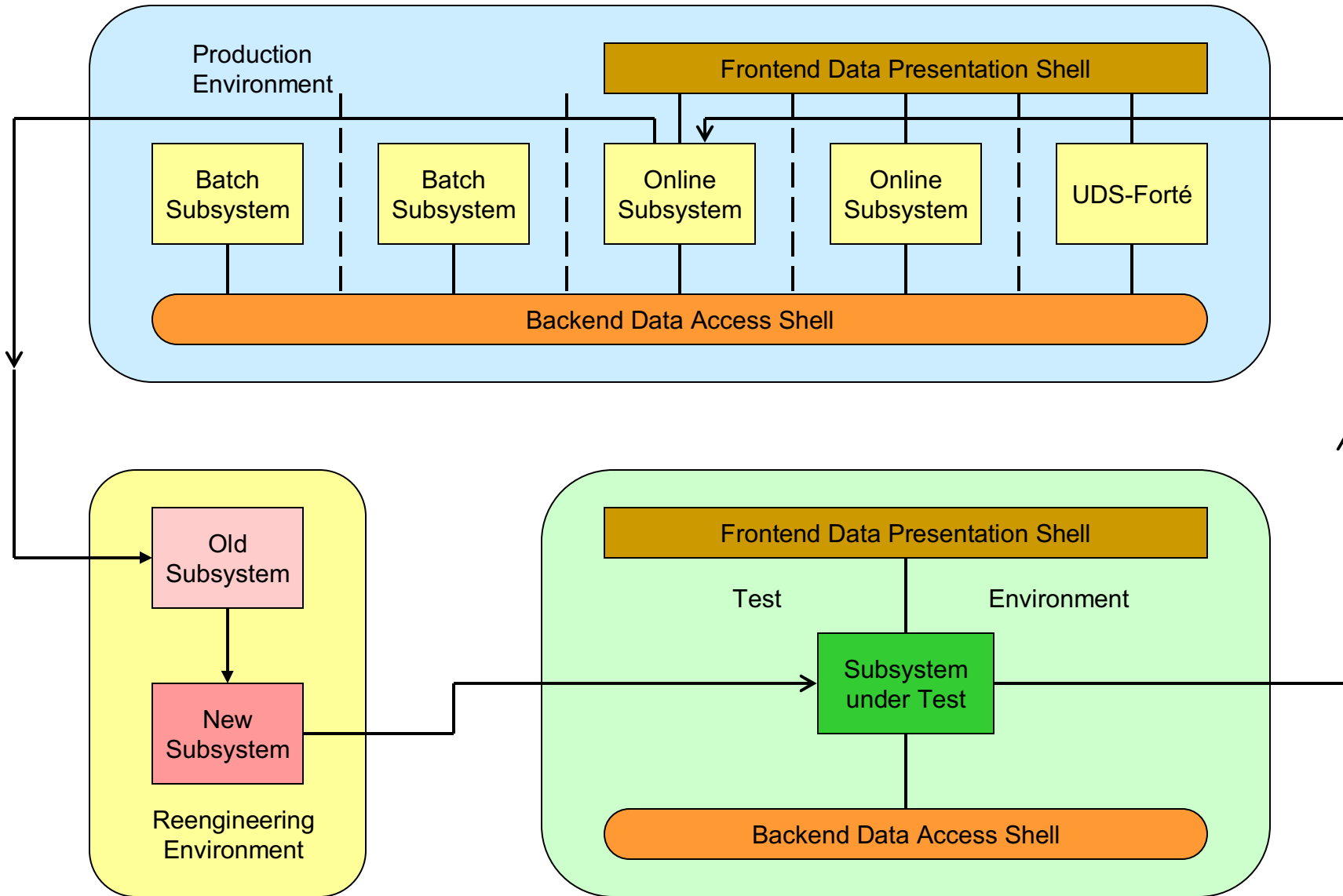
Fig. 6: SuperKlasse mit den globalen Daten



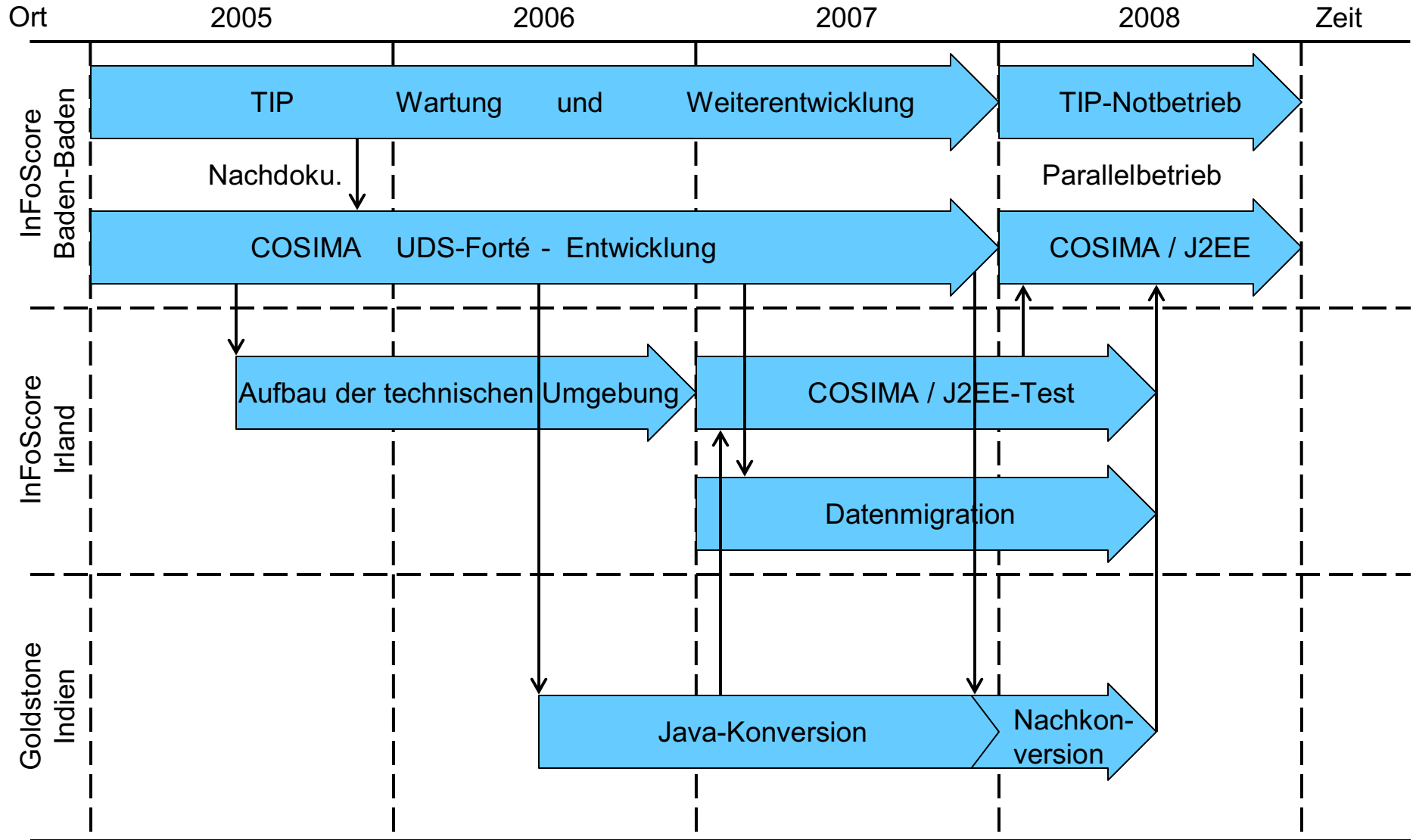
Inkrementeller Migration Process



Abschottung der bestehenden Komponente



Aufbau der Migrationsumgebung



Beispiel eines Migrationsprojektplanes