

# STATIC CODE ANALYSIS @ EVENTIM

PBUGG 2019 | Frankfurt, May 20<sup>th</sup> & 21<sup>st</sup>



Uwe Lappöhn | CTS EVENTIM

COMPANY PROFILE

PURPOSE OF STATIC CODE ANALYSIS

OUR MOTIVATION

TOOL 1: SONARQUBE

TOOL 2: SOTOARC

# COMPANY PROFILE



- Market Leader in Ticketing & Live Entertainment in Europe
- Proprietary Development
- Operating in 20+ Countries
- Growth from von € 15 Million (1999) to € 1.2 Billion (2018)
- Specialized Systems for Specialized Segments



- 250 Million Tickets in 2018
- 200,000 Events
- 3.100 Employees
- Rock, Pop, Sports, Classic, Festivals ...

## Konzerthaus Berlin



Gendarmenmarkt, 10117 BERLIN  
► Anfahrt ► Parken

## SAVONLINNAN OOPERAJUHLIEN LAHJAKORTTI - Liput

Lahjakortti on voimassa vuoden ostopäivästä



Liput alk. 22,50 €

**Osta nyt!**

► Kerro kaverille

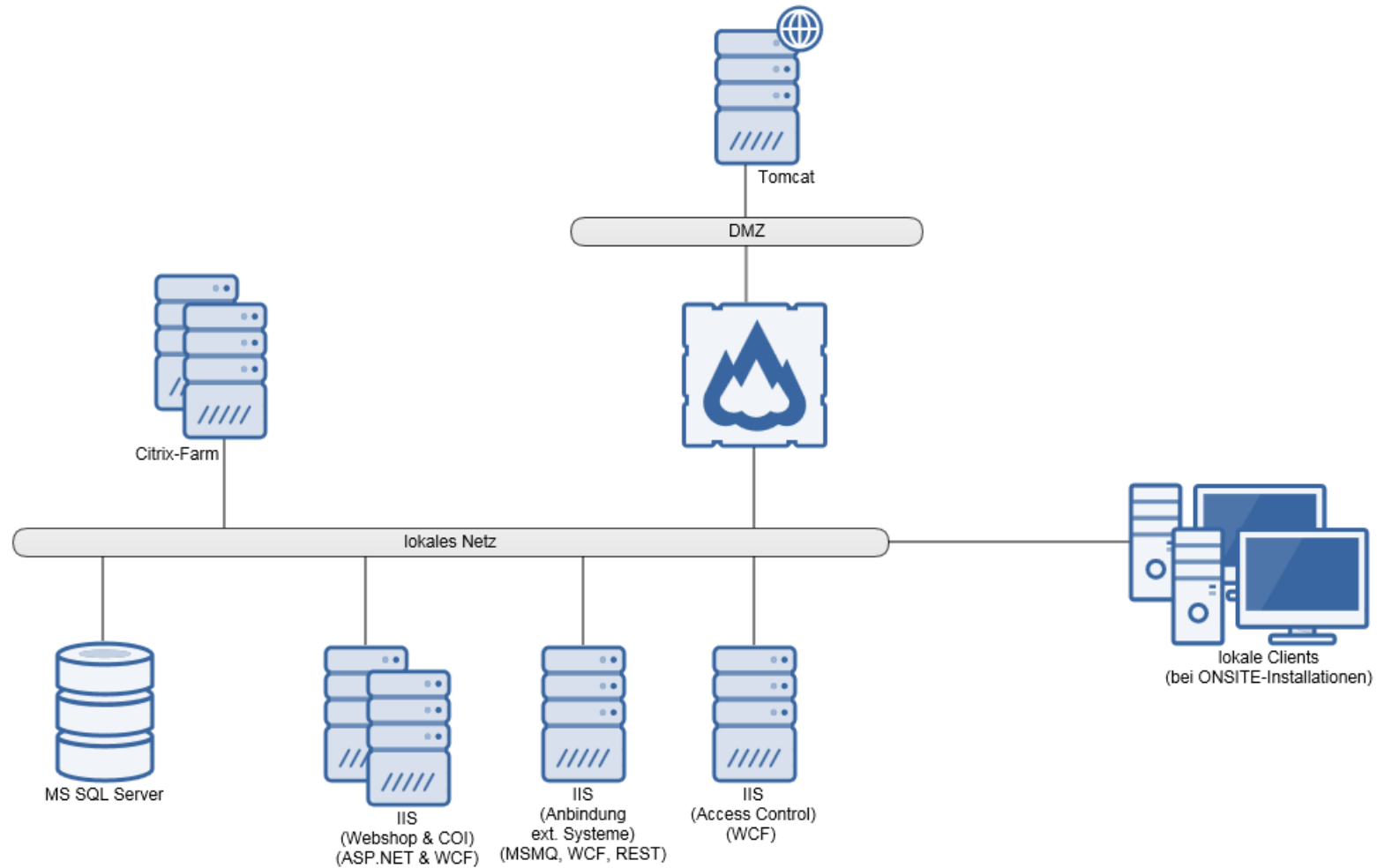
Varaukset puhelimella 020 700 0000  
Loka päivä klo. 7-22





A central shopping cart icon is surrounded by various functional icons:

- Top row: Printer, Document, 3D cube, Chat bubbles.
- Left column: Printer, Euro symbol, Ticket, Calculator.
- Right column: QR code, Play button, Gears, Person.
- Bottom row: Document with 'x', Grid, Bar chart, Group of people.

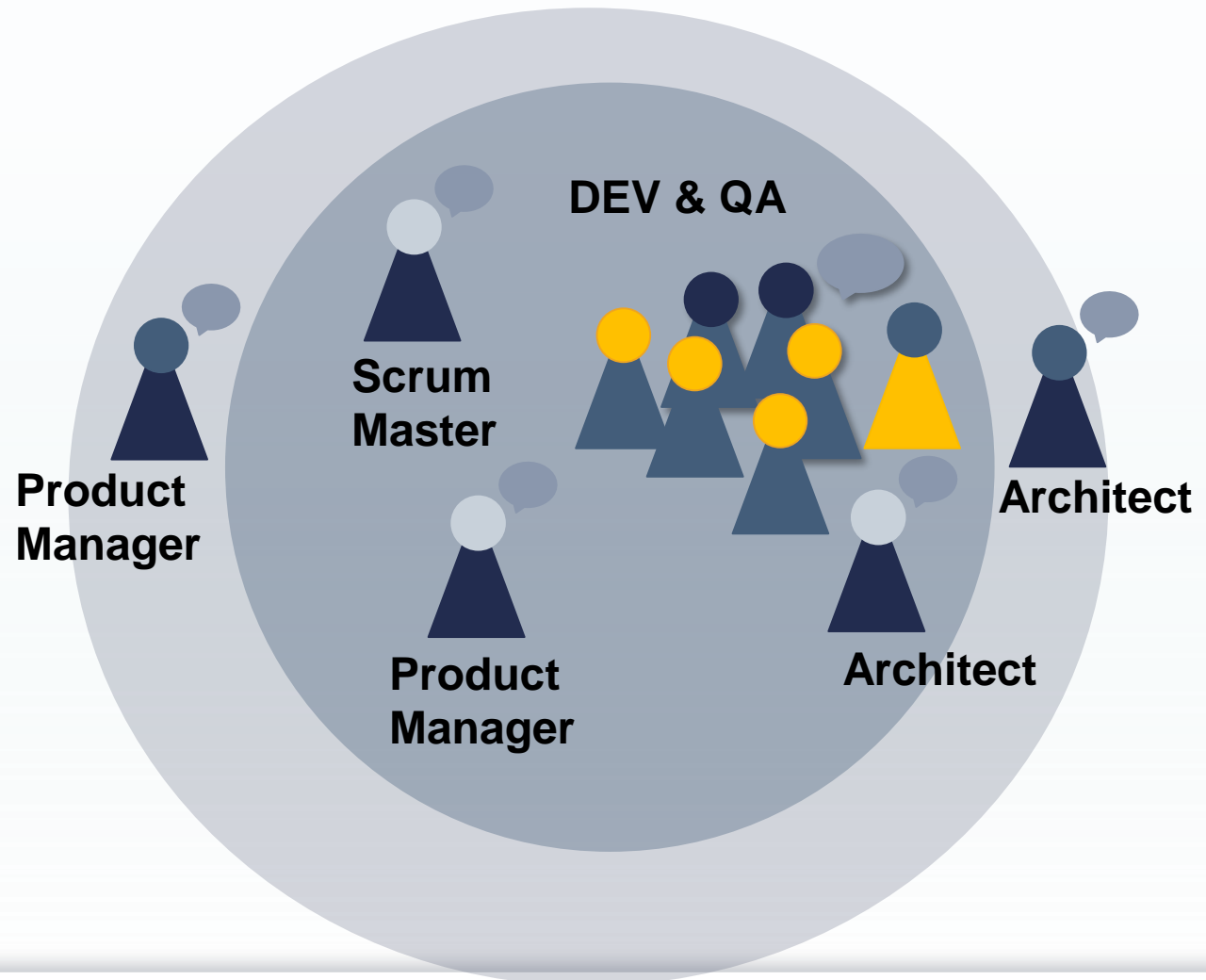


## FOCUS-TEAMS

ONLINE

LOGIC

NUMBERS





COMPANY PROFILE

**PURPOSE OF STATIC CODE ANALYSIS**

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## ✦ WHAT'S THAT?

- ✦ ... *static* because the program analyzed does not need to be executed
- ✦ ... white-box approach
- ✦ ... works tool-based
- ✦ ... can be integrated into a build pipeline

## ✦ AND WHAT'S THAT FOR?

✦ ... helps to understand the code structure

✦ ... checks coding standards

✦ ... finds code smells

COMPANY PROFILE

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# STATIC CODE ANALYSIS: OUR MOTIVATION



# STATIC CODE ANALYSIS: OUR MOTIVATION



# STATIC CODE ANALYSIS: OUR MOTIVATION



## ✦ WE NEED IT BECAUSE

✦ ... we constantly want to improve the quality of our code.

✦ ... our team grew (from 6 to >20) and grows

✦ ... we want to avoid code smells

✦ ... we started a project to renew our software architecture

✦ N-tier

✦ C#

✦ Domain Driven Design



COMPANY PROFILE

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## **SONARQUBE AND POWERBUILDER?**

<https://www.sonarqube.org/>

## ✦ WHAT WE DID TO MAKE IT WORK

- ✦ ... created a plugin that uses PowerScript as grammar
- ✦ ... implemented rules using the new grammar
- ✦ ... integrated the plugin into Sonarqube

My Favorites All

Perspective: Overall Status Sort by: Name 1 project

Filters

Quality Gate

Passed	1	<div style="width: 100%;"></div>
Warning	0	<div style="width: 0%;"></div>
Failed	0	<div style="width: 0%;"></div>

Reliability ( Bugs )

A	0	<div style="width: 0%;"></div>
B	0	<div style="width: 0%;"></div>
C	1	<div style="width: 100%;"></div>
D	0	<div style="width: 0%;"></div>
E	0	<div style="width: 0%;"></div>

Security ( Vulnerabilities )

A	1	<div style="width: 100%;"></div>
B	0	<div style="width: 0%;"></div>
C	0	<div style="width: 0%;"></div>
D	0	<div style="width: 0%;"></div>
E	0	<div style="width: 0%;"></div>

Maintainability ( Code Smells )

A	1	<div style="width: 100%;"></div>
B	0	<div style="width: 0%;"></div>

☆ [art](#) Passed

Last analysis: May 12, 2019, 3

This project is empty.

1 of 1 shown

**Embedded database should be used for evaluation purposes only**

The embedded database will not scale, it will not support upgrading to newer versions of SonarQube, and there is no support for migrating your data out of it into a different database engine.

Maintainability (Code Smells)

A	1
B	0
C	0
D	0
E	0

Coverage

≥ 80%	0
70% - 80%	0
50% - 70%	0
30% - 50%	0
< 30%	0
No data	1

Duplications

< 3%	1
3% - 5%	0
5% - 10%	0
10% - 20%	0
> 20%	0
No data	0

Size

< 1k	0
1k - 10k	0
10k - 100k	0

Perspective: Overall Status Sort by: Name 1 project

☆ [art](#) Passed

This project is empty.

Last analysis: May 12, 2019, 3

1 of 1 shown

**Embedded database should be used for evaluation purposes only**

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My Issues All

Bulk Change [up/down] to select issues [left/right] to navigate 1/2 issues 1h effort

Filters

Type

- Bug 2
- Vulnerability 0
- Code Smell 0
- Security Hotspot 0

Severity

- Blocker 0
- Critical 0
- Major 2
- Minor 0
- Info 0

- Resolution
- Status
- Creation Date
- Language
- Rule
- Standard
- Tag

art0025/w\_sheet\_rep\_art\_leistgruppe\_export.srw

Remove or implement this empty catch block ... 18 days ago L348

Bug Major Open Not assigned 30min effort Comment No tags

art0030/w\_sheet\_rep\_art\_leistung\_export.srw

Remove or implement this empty catch block ... 18 days ago L345

Bug Major Open Not assigned 30min effort Comment No tags

2 of 2 shown

**Embedded database should be used for evaluation purposes only**

The embedded database will not scale, it will not support upgrading to newer versions of SonarQube, and there is no support for migrating your data out of it into a different database engine.



art0025/w\_sheet\_rep\_art\_leistgruppe\_export.srw

art0025/w\_sheet\_rep\_art\_leistgruppe\_export...

**Remove or implement this empty catch block**

Bug Major

art0030/w\_sheet\_rep\_art\_leistung\_export.srw

**Remove or implement this empty catch block**

Bug Major

2 of 2 shown

```

342         Object.zeile_str[l1_cnt] = lgs_zadr2.zeile_str
343         Object.zeile_ort[l1_cnt] = lgs_zadr2.zeile_ort
344         Object.zeile_tel[l1_cnt] = lgs_zadr2.zeile_tel
345         SetItem(l1_cnt, "zeile_nachname2", lgs_zadr2.zeile_nachname2)
346         SetItem(l1_cnt, "zeile_nachname", lgs_zadr2.zeile_nachname)
347
348         tdevr...         catch(u_ex_zadr_notfound lu_ex_zadr_notfound)
349
350
351
352         END IF
353
354         kreim...         // in einheitliche W$$HEX1$$e400$$ENDHEX$$hrung umrechnen.
355                         parent.ofp_umrech_zeile_whrg(l1_cnt, ls_rep_whrg, 'summe_leistgruppe', 'fk_waehru
356         ozinke           //MWST Betrag berechnen und setzen.
357                         parent.ofp_set_mwst_betrag( l1_cnt, 'leistkund_lgpsum_v_fk_mwst_nr' , 'summe_lei
358         kreim...
359         mbuec...         NEXT
360
361                         //Jetzt Liste mit dem neu gesetzten Sortfeld zeile_nachname2 sortieren.
362                         dw_liste.Sort()
363
364         catch(u_ex lu_ex)
365                         this.ofp_debugmode(iu_env, 'retrieveend', lu_ex, 0)
366         finally
367                         destroy lu_nvo_zadr

```

**Remove or implement this empty catch block** ... 18 days ago L348

Bug Major Open Not assigned 30min effort Comment No tags





Filter events... Start Date to End Date Reset dates

not provided

May 12, 2019

- 3:42 PM Version: not provided
- 2:47 PM

May 8, 2019

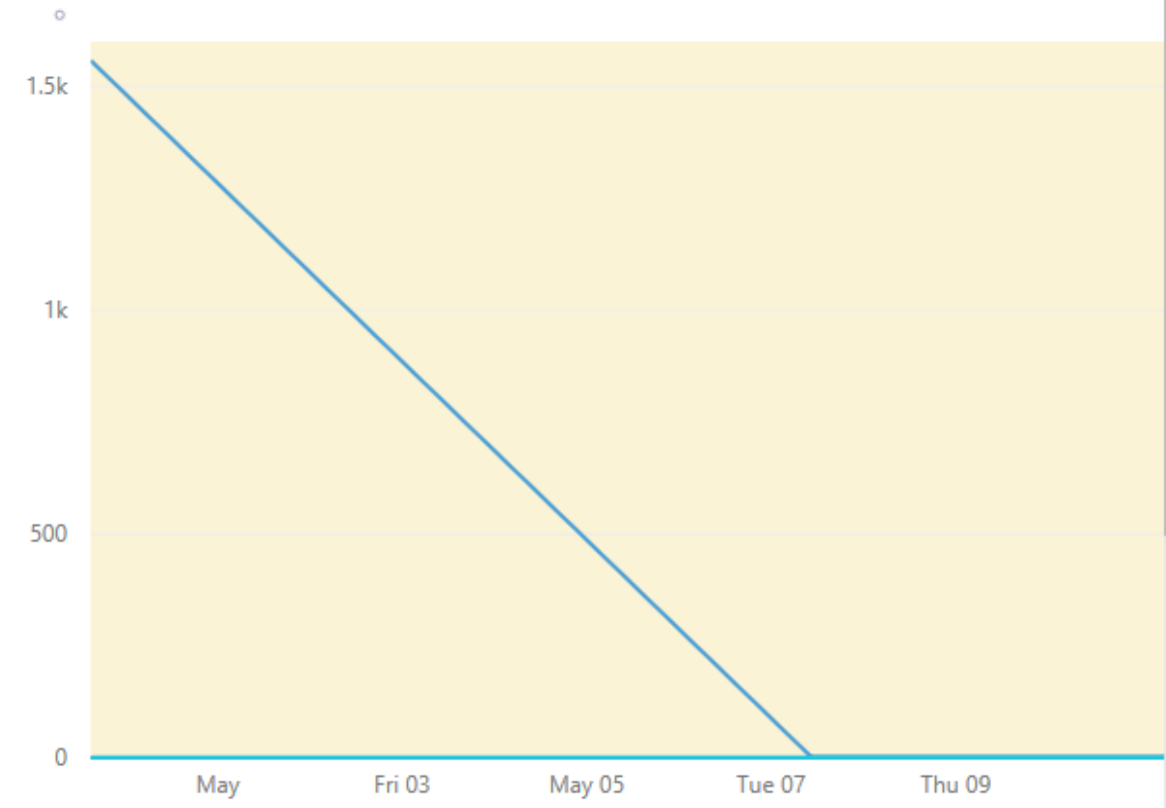
- 10:21 AM Quality Gate: Green (was Red)
- Quality Profile: Use 'PowerScript Rules Uwe' (PowerScript)
- Quality Profile: Stop using 'PowerScript Rules' (PowerScript)

April 30, 2019

- 2:58 PM Quality Gate: Red (was Green)

Issues

Bugs Code Smells Vulnerabilities



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## ✦ WHAT IS THAT THING?

- ✦ Visualizes the static structure of a system
- ✦ Helps to understand the structure
- ✦ Helps to model a target architecture
- ✦ Performs a conformity check
- ✦ Checks and detects where the code is not compliant
- ✦ Simulates potential restructurings and their effects

## **SOTOARC AND POWERBUILDER?**

<https://www.hello2morrow.com/products/sotograph>

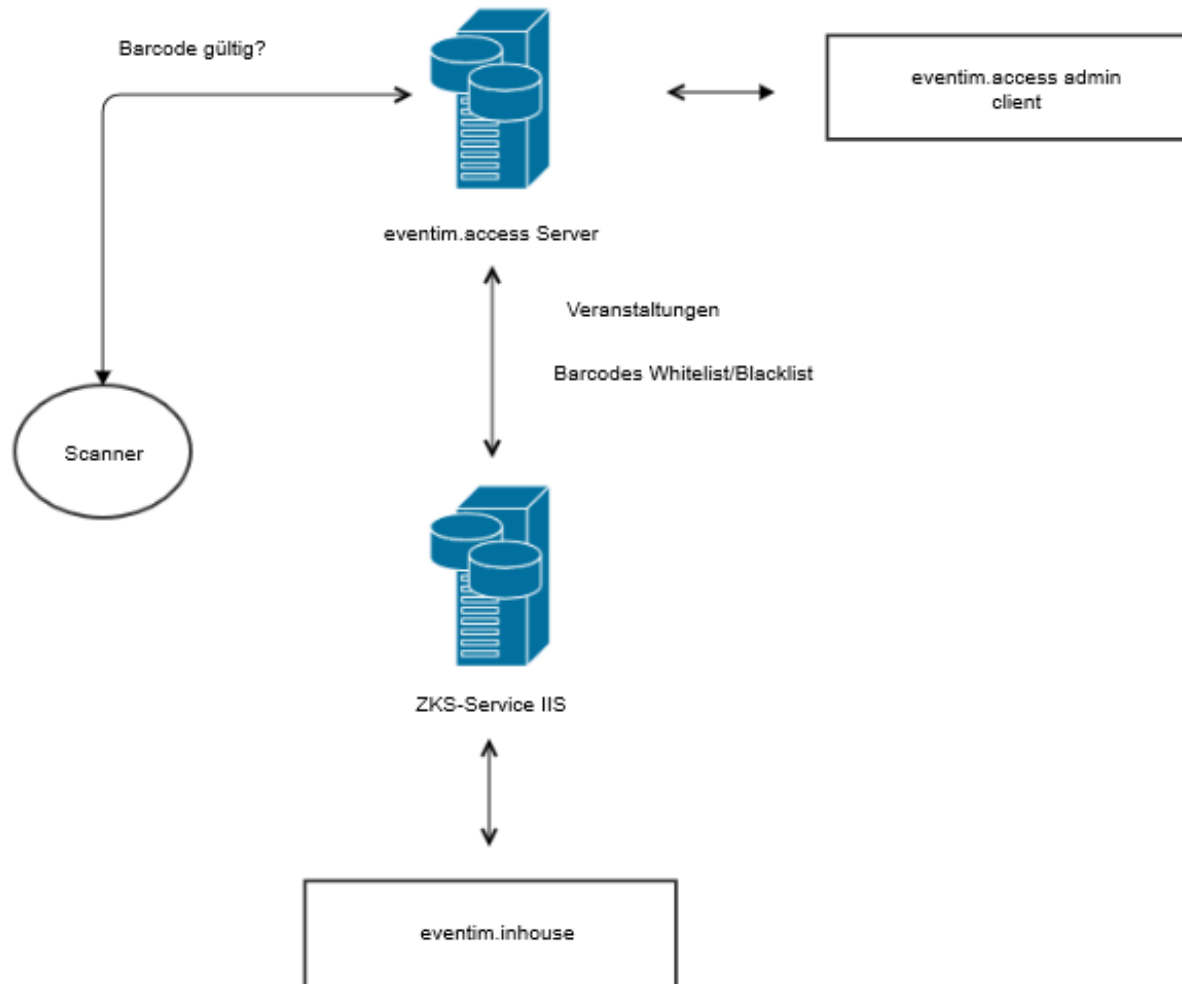
## ✦ WHAT WE DID

✦ ... we took a stable and relatively invariable package →

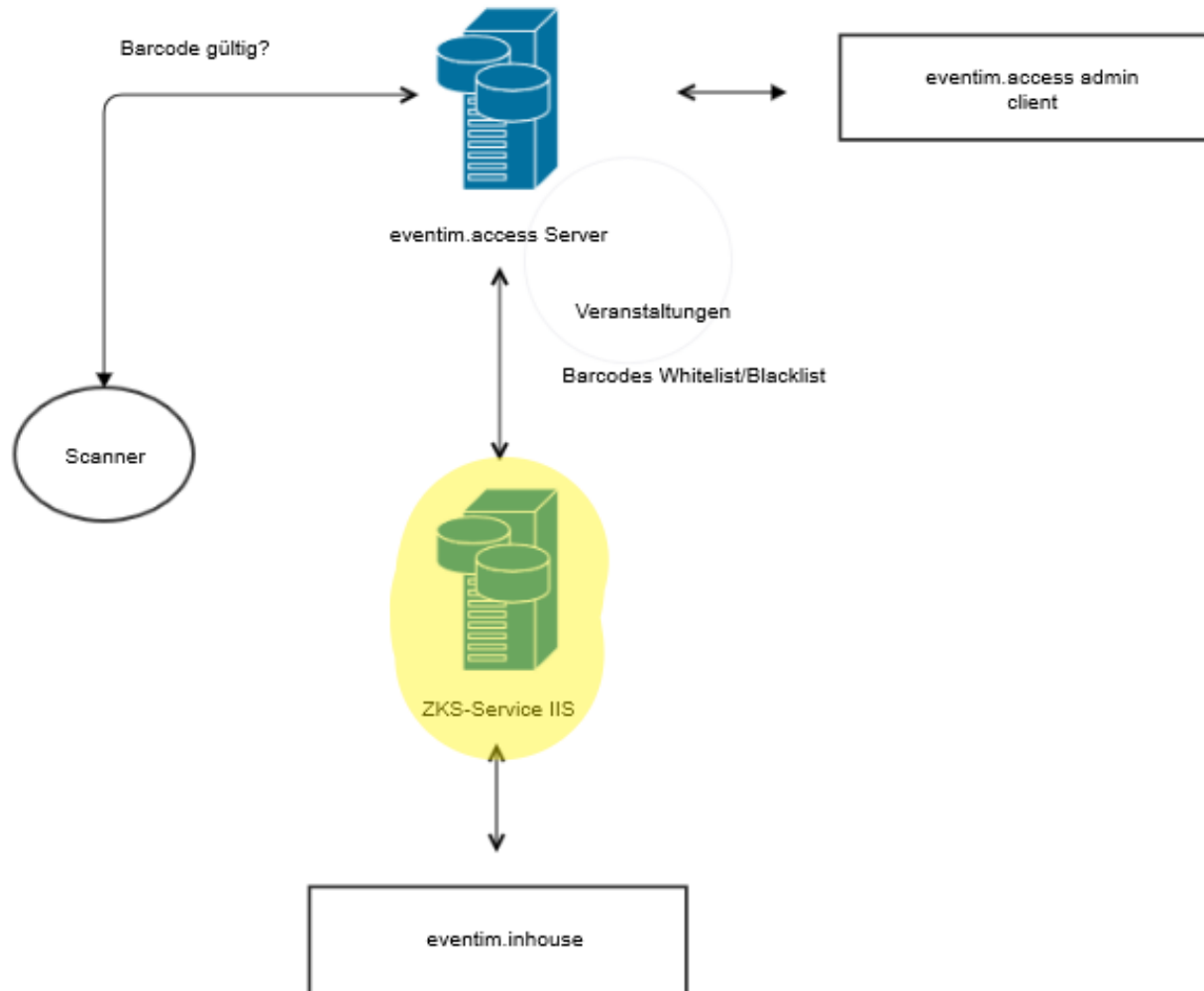
## ✦ ACCESS CONTROL

✦ Performs the interaction between INHOUSE and ACCESS CONTROL

# EXAMPLE



# EXAMPLE





## ✦ WHAT WE DID TO MAKE IT WORK

- ✦ ... ZKS-Service is coded in Powerbuilder
- ✦ ... C# will be generated with PB.Net from Powerscript
- ✦ ... C# is deployed on IIS
- ✦ ... generated C# code is base for SOTOARC

**Start SOTOARC with original code structure**

Cycle Analysis Metrics  
Original Code Models  
Restructured Code Architecture

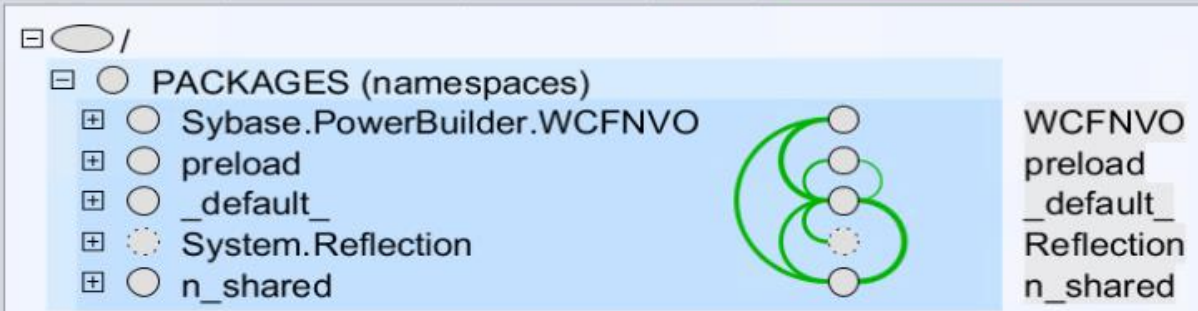
Do Not Color Nodes [v] [undo] [redo] Undo/Redo (Modeling) [refresh]

1(Base) [x] [copy]

[search] [zoom] [fit] [back] [forward] [refresh]

[search] [zoom] [fit] [home] [back] [forward] [refresh] [view] [Architecture View] [Show All Arcs]

- /
- PACKAGES (namespaces)
- Sybase.PowerBuilder.WCFNVO
- preload
- \_default\_
- System.Reflection
- n\_shared



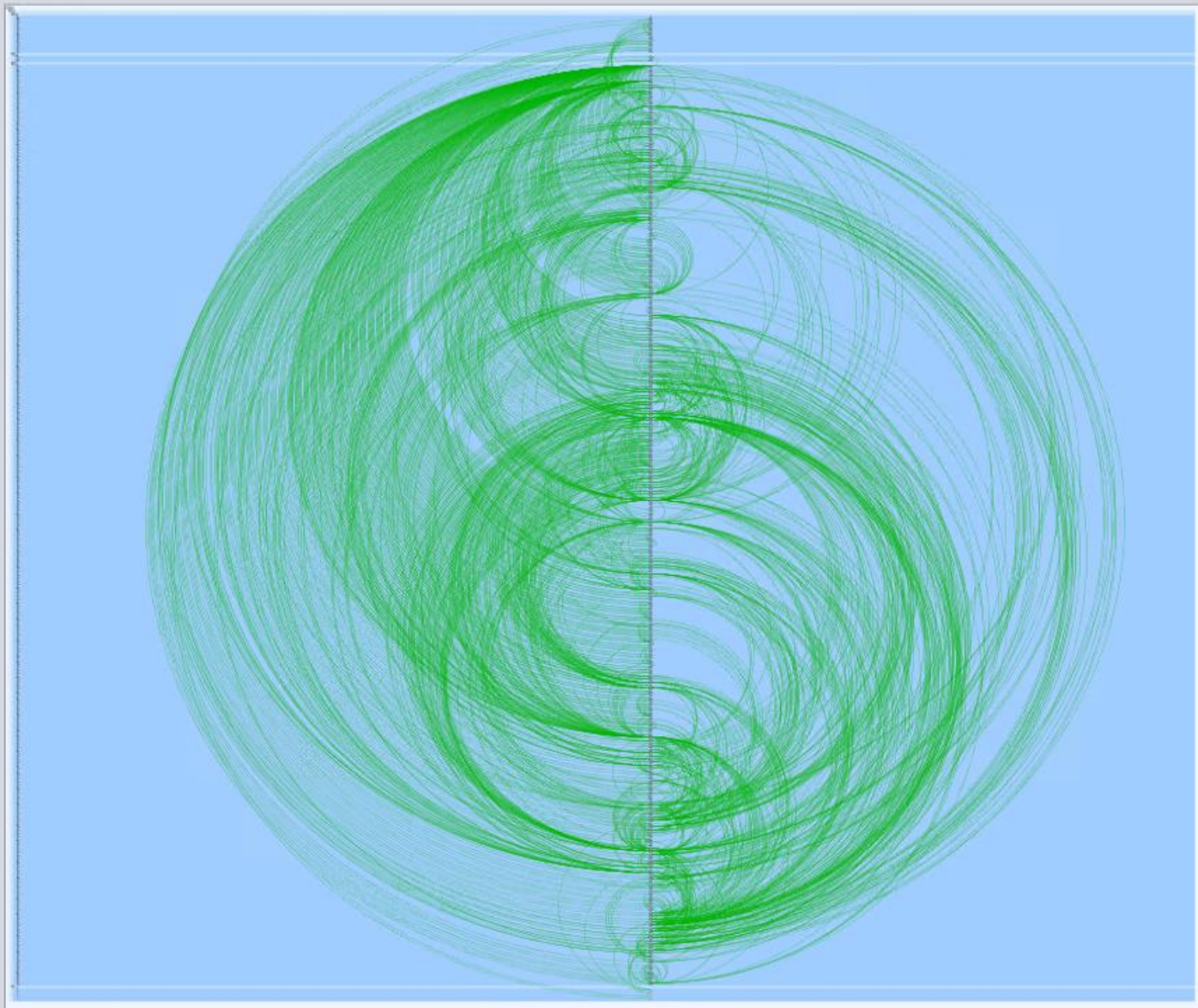
Cycle Analysis	Metrics
Original Code	Models
Restructured Code	Architecture

Do Not Color Nodes  Undo/Redo (Modeling)

1(Base)

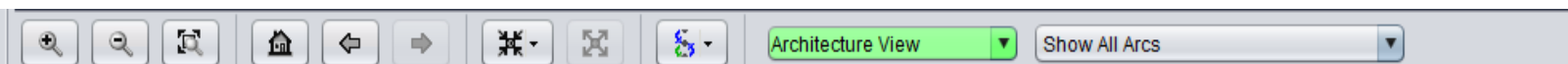
Architecture View  Show All Arcs

- /
- PACKAGES (namespaces)
  - Sybase.PowerBuilder.WCFNVO
  - preload
  - \_default\_
  - System.Reflection





- /
- PACKAGES (namespaces)
  - Sybase.PowerBuilder.WCFNVO
  - preload
  - \_default\_
  - System.Reflection



Architecture View

Show All Arcs

- /
- PACKAGES (namespaces)
  - Sybase.PowerBuilder.WCFNVO
    - △ STAOperationSupport.cs
    - △ n\_shared\_n\_iis\_garbagecollector\_wrapper.cs
    - △ n\_shared\_n\_iis\_monitoring\_wrapper.cs
    - △ n\_shared\_rs\_trans\_info\_plus\_wrapper.cs
    - △ n\_shared\_rs\_trans\_info\_wrapper.cs
    - △ poolmanager\_rs\_pool\_info\_plus\_wrapper.cs
    - △ poolmanager\_rs\_pool\_info\_wrapper.cs
    - △ shs\_nsrv2\_gs\_ref\_nvoint\_wrapper.cs
    - △ zks\_einlass\_u\_nvoint\_webservice\_evaxml\_ts\_iis\_wrapper.cs
    - △ zks\_einlass\_u\_nvoint\_zks\_einlass\_wrapper.cs
    - △ zks\_manager\_u\_nvo\_zks\_manager\_wrapper.cs
    - △ zks\_manager\_u\_nvo\_zks\_requester\_wrapper.cs
  - preload
    - △ iis\_standard\_u\_nvo\_preload\_iis\_u.cs
    - △ iis\_standard\_u\_nvo\_preload\_iis\_wrapper.cs
  - \_default\_
    - △ PBGlobalDefinitions\_wcfservice\_zks.cs
    - △ iis\_standard\_adac\_tomitgliedchecksoapclient\_u.cs
    - △ iis\_standard\_evaxml4zks\_u\_nvoint\_webservice\_evaxml\_ts\_iisclient\_u.cs
    - △ iis\_standard\_evaxml\_3\_3\_tsservicessoapclient\_u.cs
    - △ iis\_standard\_n\_enable\_u.cs
    - △ iis\_standard\_u\_nvo\_eas\_client\_siae\_iis\_u.cs
    - △ n\_shared\_n\_iis\_config\_intern\_u.cs
    - △ n\_shared\_n\_iis\_fehler\_u.cs
    - △ n\_shared\_n\_iis\_garbagecollector\_u.cs
    - △ n\_shared\_n\_iis\_monitoring\_u.cs
    - △ n\_shared\_rs\_trans\_info\_plus\_u.cs
    - △ n\_shared\_rs\_trans\_info\_u.cs
    - △ n\_shared\_u\_nvo\_config\_sperre\_u.cs
    - △ n\_shared\_u\_shared\_u.cs
    - △ poolmanager\_gs\_iis\_preload\_s.cs
    - △ poolmanager\_rs\_pool\_info\_plus\_u.cs
    - △ poolmanager\_rs\_pool\_info\_u.cs
    - △ poolmanager\_u\_nvo\_collection\_add\_sperre\_u.cs
    - △ poolmanager\_u\_nvo\_collection\_linkedlist\_u.cs
    - △ poolmanager\_u\_nvo\_collection\_u.cs
    - △ poolmanager\_u\_nvo\_iis\_info\_u.cs
    - △ poolmanager\_u\_nvo\_iis\_sperre\_set\_not\_connected\_u.cs
    - △ poolmanager\_u\_nvo\_iis\_sperre\_u.cs
    - △ poolmanager\_u\_nvo\_iis\_trans\_u.cs
    - △ poolmanager\_u\_nvo\_itembase\_sperre\_u.cs
    - △ poolmanager\_u\_nvo\_itembase\_u.cs
    - △ poolmanager\_u\_nvo\_linkedlist\_item\_u.cs
    - △ poolmanager\_u\_nvo\_pool\_data\_add\_u.cs
    - △ poolmanager\_u\_nvo\_pool\_data\_multi\_u.cs
    - △ poolmanager\_u\_nvo\_pool\_data\_multi\_u.cs
    - △ poolmanager\_u\_nvo\_pool\_data\_u.cs

Restructured Code Architecture  
 Cycle Analysis Metrics  
 Original Code Models

Do Not Color Nodes Undo/Redo (Modeling)

1(Base) [X] [ ]

Architecture View Show All Arcs

- poolmanager\_u\_nvo\_pool\_manager\_u.cs
- poolmanager\_u\_nvo\_pool\_sperre\_data\_u.cs
- poolmanager\_u\_nvo\_pool\_sperre\_loglevel\_u.cs
- poolmanager\_u\_nvo\_pool\_sperre\_session\_u.cs
- poolmanager\_u\_nvo\_pool\_sperre\_u.cs
- poolmanager\_u\_nvo\_preload\_info\_u.cs
- poolmanager\_u\_nvo\_session\_manager\_u.cs
- shs\_ncaching\_u\_nvo\_cache\_k\_blockbez\_u.cs
- shs\_ncaching\_u\_nvo\_cache\_k\_vorst\_k\_vbt\_u.cs
- shs\_ncaching\_u\_nvo\_cache\_k\_vorst\_u.cs
- shs\_nitalien\_iis\_u\_nvo\_siae\_mai\_client\_u.cs

File /PACKAGES/\_default/shs\_ncaching\_u\_nvo\_cache\_k\_vorst\_u.cs;

source directory C:/Users/Public/Inhouse/zks\_iis - uwe/wcfservice\_zks.out;

build unit tree:

- Target assembly: C:/Users/Public/Inhouse/zks\_iis - uwe/wcfservice\_zks.out/bin/Debug/wcfservice\_zks.dll
- C# project file: C:/Users/Public/Inhouse/zks\_iis - uwe/wcfservice\_zks.out/wcfservice\_zks.csproj
- C# solution file: C:/Users/Public/Inhouse/zks\_iis - uwe/wcfservice\_zks.out/zks\_iis\_solution.sln;

annotation(s) of contained classes:

1. Sybase.PowerBuilder.PBFieldInfoCollectionAttribute("is\_dataobject", "ds\_u\_nvo\_cache\_k\_vorst", typeof(Sybase.PowerBuilder.PBString),

"il\_zeitraum\_gueltig", 300, typeof(Sybase.PowerBuilder.PBInt),

"il\_max\_dsanzahl", 200, typeof(Sybase.PowerBuilder.PBInt))

internal class c\_u\_nvo\_cache\_k\_vorst : c\_u\_nvo\_cache

{

public c\_u\_nvo\_cache\_k\_vorst c\_iu\_nvo\_cache\_profile iu\_nvo\_cache\_profile = null;

public c\_u\_nvo\_cache\_k\_vorst c\_iu\_nvo\_cache\_k\_blockbez iu\_nvo\_cache\_k\_blockbez = null;

[Sybase.PowerBu;

2. Sybase.PowerBuilder.PBGroupAttribute("u\_nvo\_cache\_k\_vorst", Sybase.PowerBuilder.PBGroupType.UserObject, "", "d:\entwicklung\lpb2017\entw\zks\_migration\zks\_eas\d\entwicklung\lpb2017\entw\std\shs\_ncaching\shs\_ncac

[Sybase.PowerBuilder.PBFieldInfoCollectionAttribute("is\_dataobject", "ds\_u\_nvo\_cache\_k\_vorst", typeof(Sybase.PowerBuilder.PBString),

"il\_zeitraum\_gueltig", 300, typeof(Sybase.PowerBuilder.PBInt),

"il\_max\_dsanzahl", 200, typeof(Sybase.PowerBuilder.PBInt))

internal clas

- shs\_nitalien\_u\_ex\_nvo\_siae\_translog\_u.cs
- shs\_nitalien\_u\_ex\_nvo\_siae\_translog\_validation\_failed\_u.cs
- shs\_nitalien\_u\_nvo\_eas\_client\_siae\_u.cs
- shs\_nitalien\_u\_nvo\_siae\_u.cs
- shs\_nsrv2\_f\_obsolete\_f.cs
- shs\_nsrv2\_gs\_mai\_vorst\_einspielung\_s.cs
- shs\_nsrv2\_gs\_monitorinfo\_s.cs
- shs\_nsrv2\_gs\_monitorinfoex\_s.cs
- shs\_nsrv2\_gs\_rect\_s.cs
- shs\_nsrv2\_gs\_ref\_nvoint\_s.cs
- shs\_nsrv2\_gs\_u\_trans\_proto\_einst\_s.cs
- shs\_nsrv2\_u\_ex\_benutzer\_inaktiv\_u.cs
- shs\_nsrv2\_u\_ex\_benutzer\_nicht\_gueltig\_u.cs
- shs\_nsrv2\_u\_ex\_benutzer\_u.cs

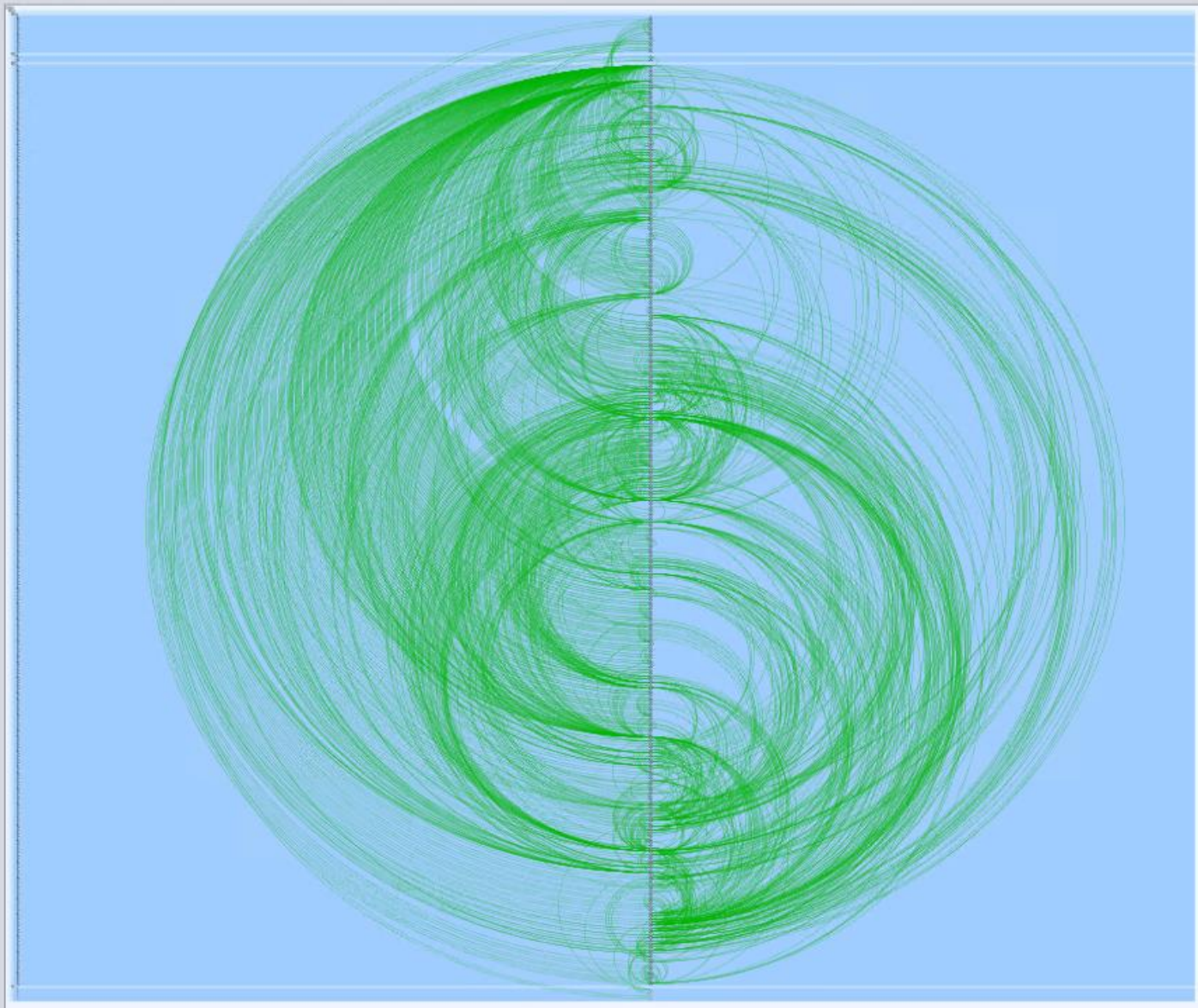
Cycle Analysis	Metrics
Original Code	Models
Restructured Code	Architecture

Do Not Color Nodes  Undo/Redo (Modeling)

1(Base)

Architecture View  Show All Arcs

- /
- PACKAGES (namespaces)
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  - preload
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  - System.Reflection



Restructured Code	Architecture
Cycle Analysis	Metrics
Original Code	Models

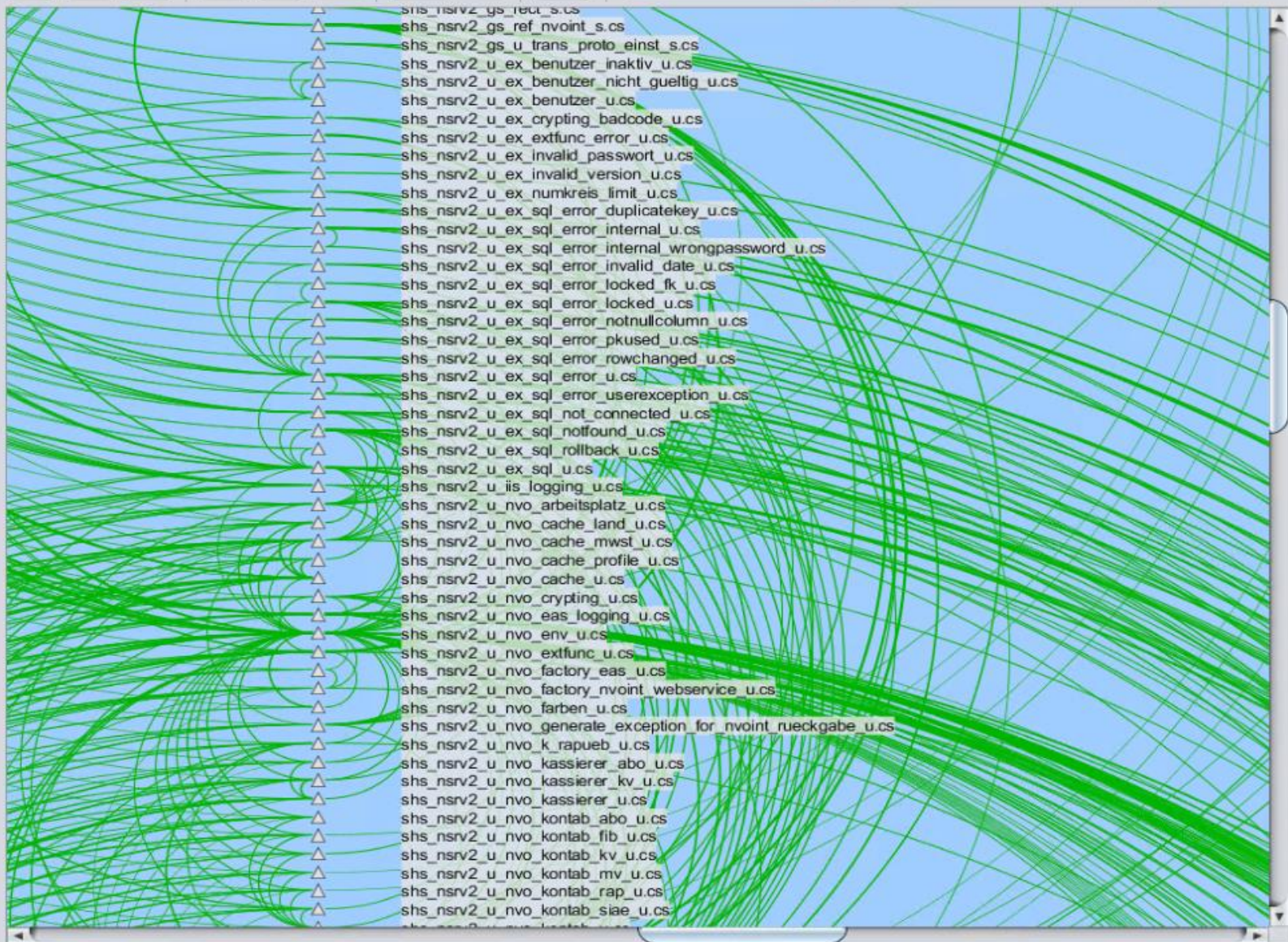
Do Not Color Nodes  Undo/Redo (Modeling)

1(Base)

Architecture View Show All Arcs

PACKAGES (namespaces)

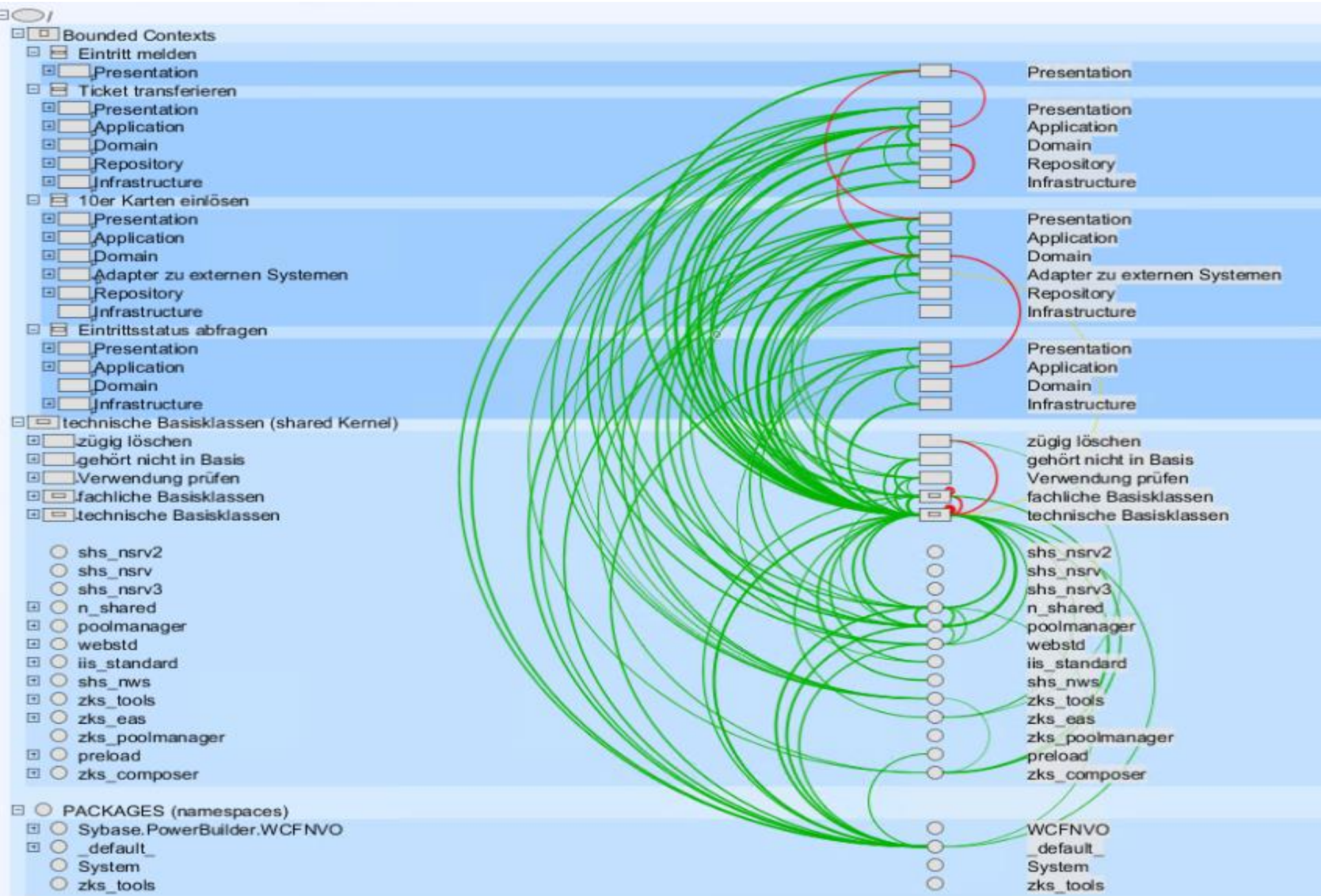
- Sybase.PowerBuilder.WCFNVO
- preload
- \_default\_
- System.Reflection

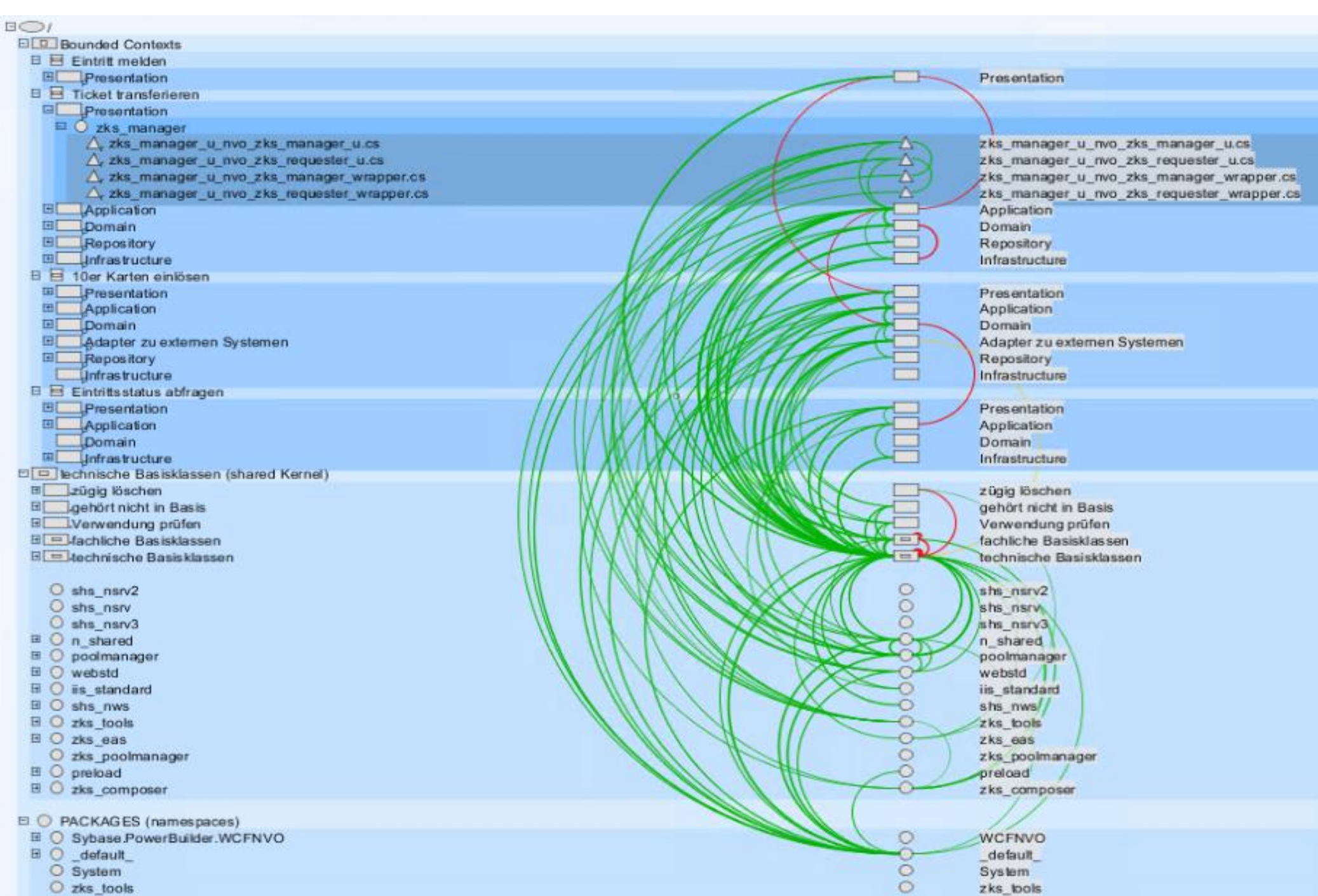




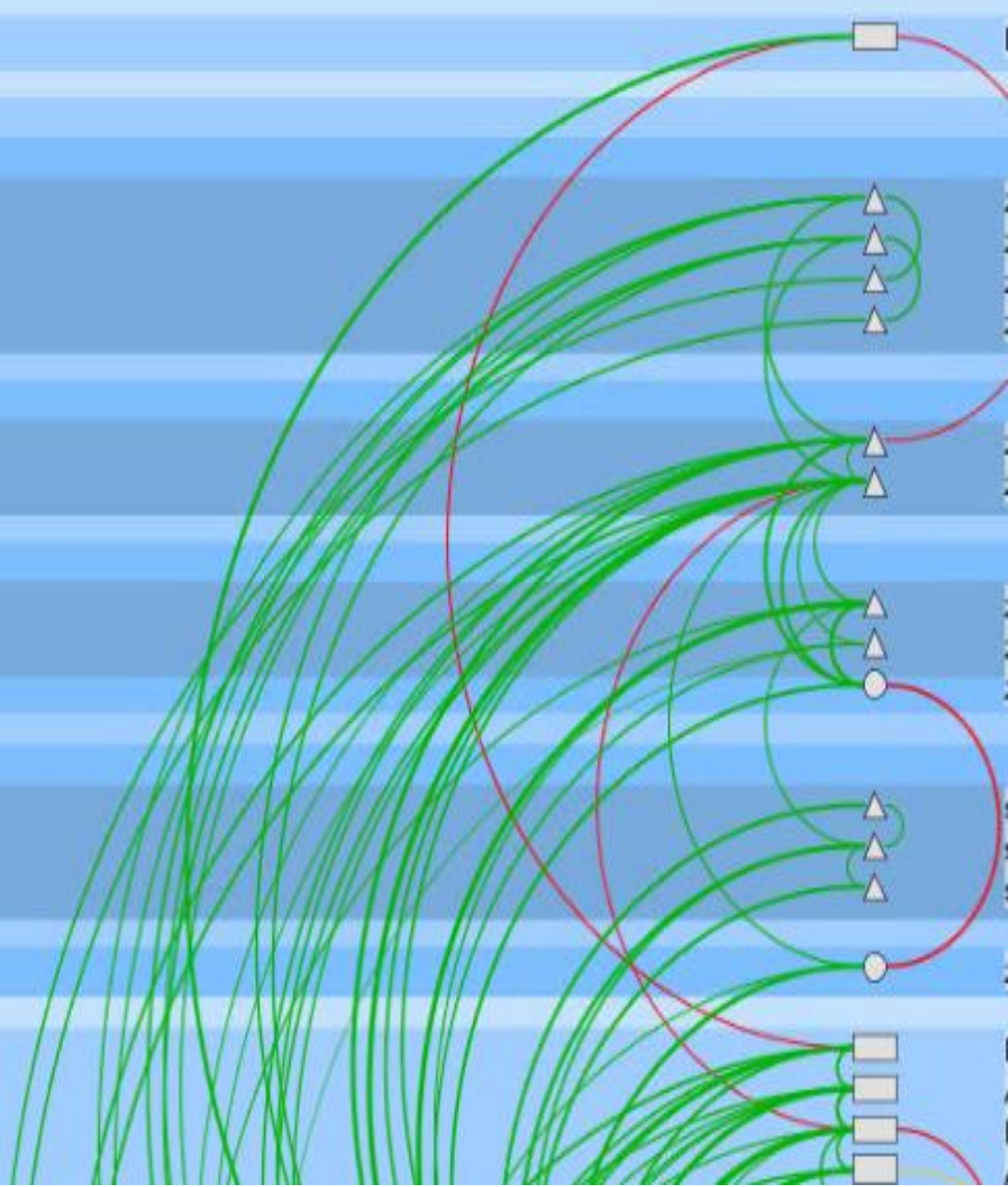
## **After the restructuring with SOTOARC**







- Bounded Contexts
  - Eintritt melden
    - Presentation
    - Ticket transferieren
      - Presentation
        - zks\_manager
          - zks\_manager\_u\_nvo\_zks\_manager\_u.cs
          - zks\_manager\_u\_nvo\_zks\_requester\_u.cs
          - zks\_manager\_u\_nvo\_zks\_manager\_wrapper.cs
          - zks\_manager\_u\_nvo\_zks\_requester\_wrapper.cs
        - Application
          - zks\_manager
            - zks\_manager\_u\_nvo\_zks\_manager\_intern\_u.cs
            - zks\_manager\_u\_nvo\_zks\_requester\_intern\_u.cs
          - Domain
            - zks\_composer
              - zks\_composer\_u\_nvo\_zks\_composer\_u.cs
              - zks\_composer\_u\_nvo\_zks\_face\_check\_event\_u.cs
            - zks\_tools
          - Repository
            - shs\_ncaching
              - shs\_ncaching\_u\_nvo\_cache\_k\_blockbez\_u.cs
              - shs\_ncaching\_u\_nvo\_cache\_k\_vorst\_u.cs
              - shs\_ncaching\_u\_nvo\_cache\_k\_vorst\_k\_vtxt\_u.cs
          - Infrastructure
            - zks\_transmitter
        - 10er Karten einlösen
          - Presentation
          - Application
          - Domain
          - Adapter zu externen Systemen



→ [uwe.lappoehn@eventim.de](mailto:uwe.lappoehn@eventim.de)

