Complex Event Processing

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HAW Hamburg – Masterstudiengang Informatik - WS 2011/2012

Agenda

- Motivation
- Grundlagen
- Event Processing Networks
- Ausblick
- Quellen

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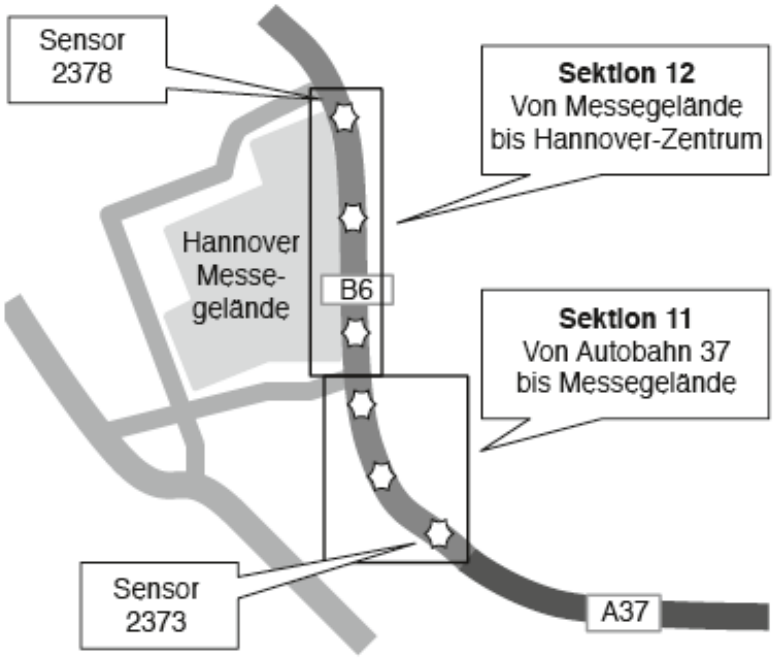
Motivation

- Unser tägliches Handeln wird durch Ereignisse beeinflusst:
  - Telefon klingelt
  - S-Bahn verspätet sich
  - …
- Geschäftsprozesse werden auch beeinflusst:
  - Kunde storniert Bestellung
  - Server fällt aus
  - …

Motivation

- Ereignisse sind für einen Großteil des menschlichen Handelns verantwortlich
- Sie stellen eine Methode zum Modellieren von Abläufen und Systemen dar



[6]

Motivation

Konkrete Anwendungsgebiete:

- Vehrkehrsüberwachung/-steuerung [6]
- Business Activity Monitoring (BAM) [6,7,9]
- …

Meine Motivation im Verlauf des Masterstudiums:

- Demand Side Management in Smart Grids
- Anbieter und Großabnehmer (Industrie, Hochschulen, …) zusammenbringen
- Automatisiertes Abschalten von z.B. Produktionsanlagen zum Lastausgleich

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Grundlagen

Was sind Ereignisse/Events?

O. Etzion und P. Niblett:
„An event is an occurence within a particular system or domain; it is something that has happened, or is contemplated as having happened in that domain. The word event is also used to mean a programming entity that represents such an occurence in a computing system."

G. Mühl et al.:
„An event can be defined as any occurence of a happening of interest that can be observed from within a computer system."

D. Luckham:
„In CEP an ‚event' is an object that can be subject to computer processing.
It signifies, or is a record of, an activity that has happened.
An event may be related to other events."

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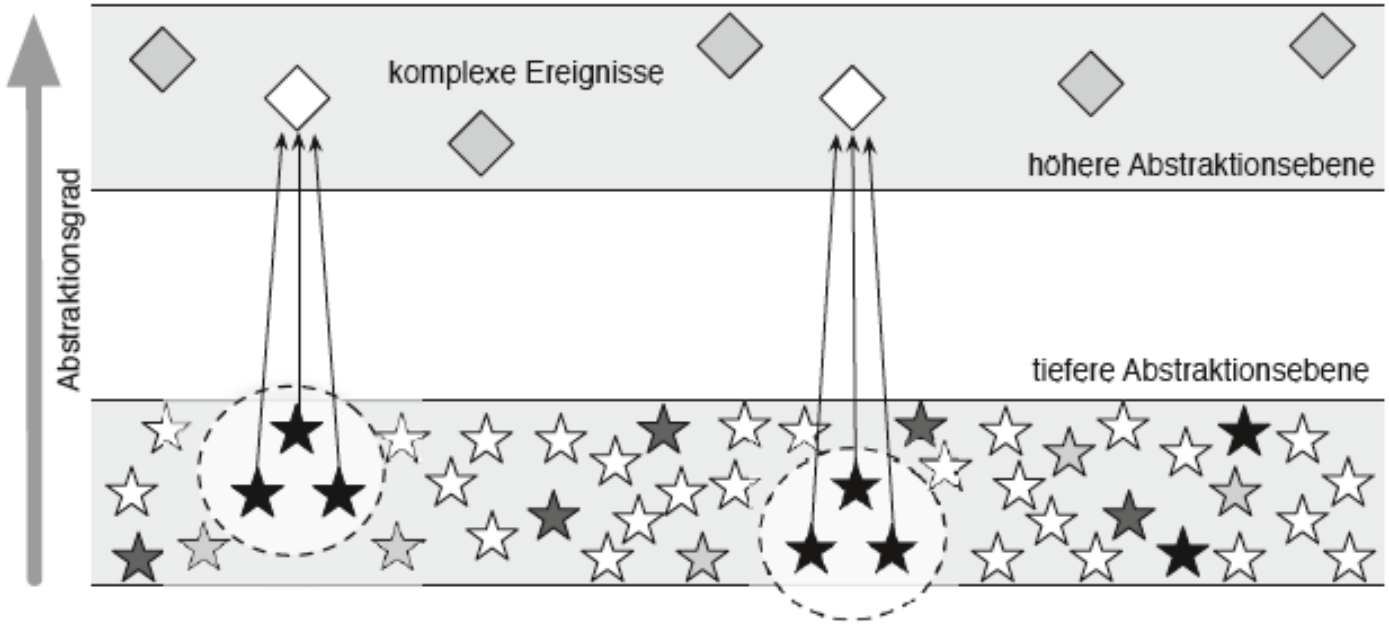
Grundlagen

Was sind komplexe Ereignisse?



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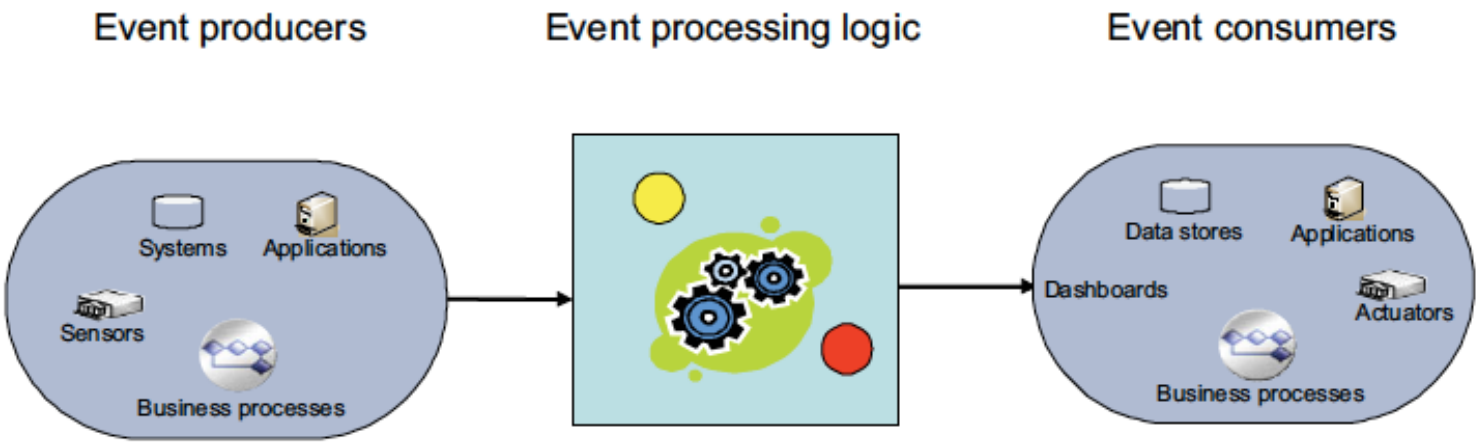
Grundlagen

- Complex Event Processing
  - Ermöglicht die parallele und dynamische Verarbeitung von mehreren Ereignissen [6]
  - Beinhaltet Methoden und Werkzeuge um Serien von Ereignissen auf Ereignismuster zu untersuchen [8]
  - Realisiert die Untersuchung auf Ereignismuster in nahezu Echtzeit
  - Ereignismuster: Ereignisse, die in Beziehung zueinander stehen
  - Beziehungsarten:
    - Kausale
    - Temporale
    - Räumliche
    - Weitere…

Grundlagen

Weitere Prinzipien:

- Lose Kopplung
- Asynchrone Verarbeitung
- Publisher/Subscriber



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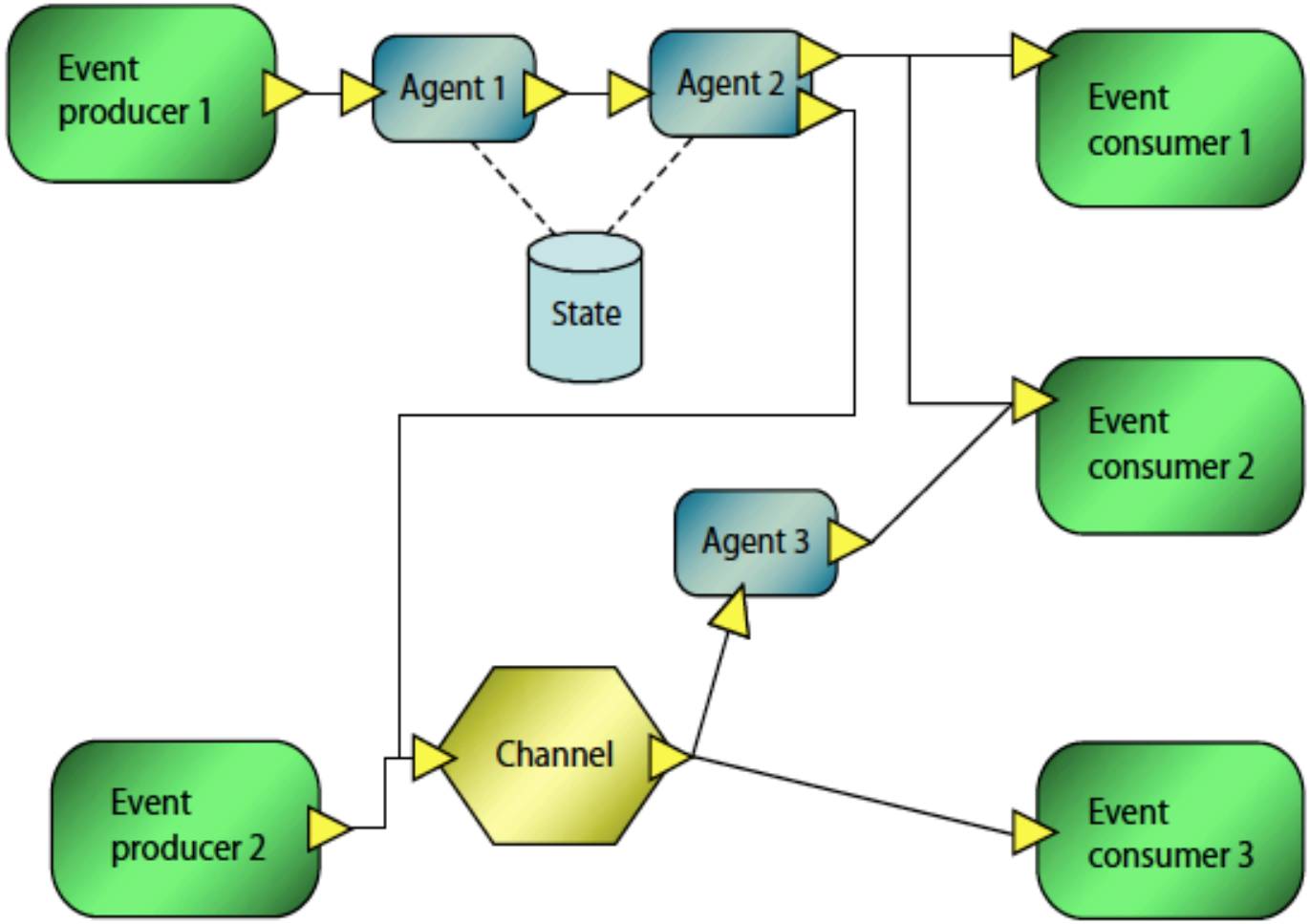
Event Processing Networks



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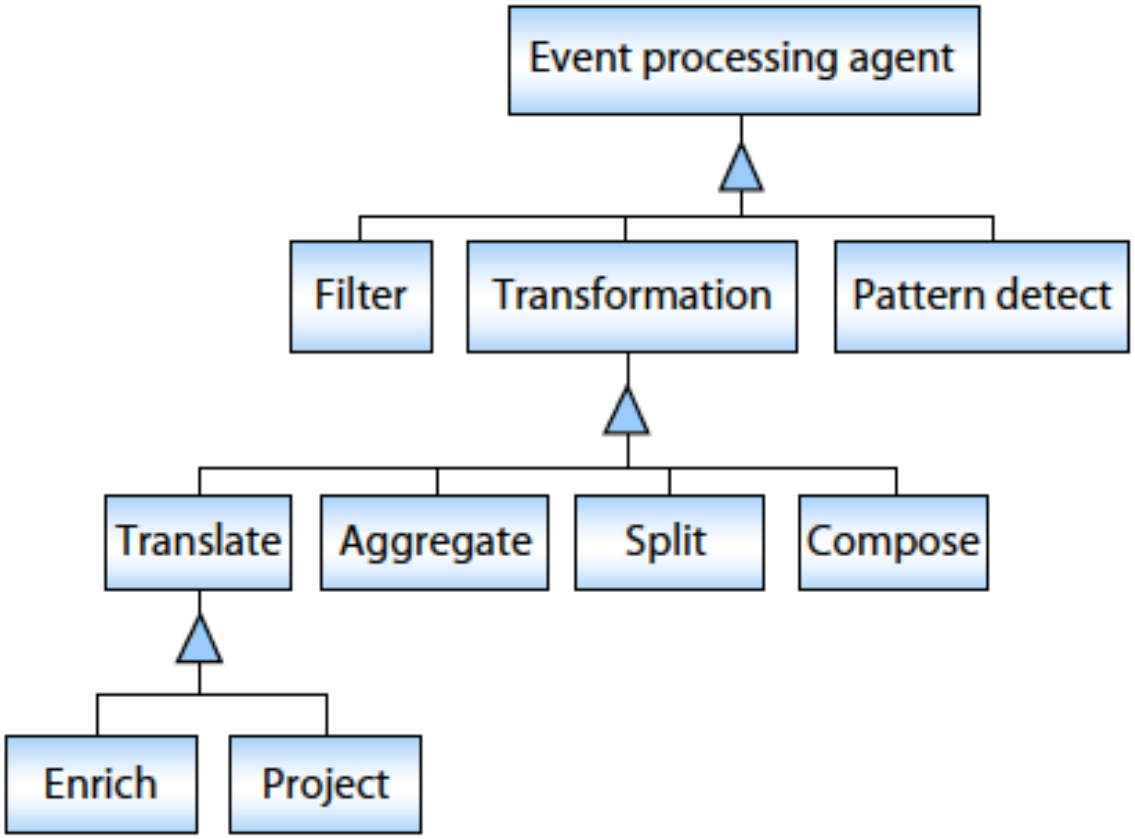
Event Processing Agents



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Ausblick

Trends beim CEP:

- Standardisierung [7]
  - Komponentenebene
  - Abfragesprachen
- Semantic Complex Event Processing (SCEP) [4,5]
  - Verbindung von Ereignissen mit anderen Konzepten des Fachbereichs
  - Wissen um die Verbindungen zur Erkennung komplexer Ereignisse nutzen

Ausblick

Trends beim CEP:

- Semi-technische Entwicklungswerkzeuge [7]
  - Neue Zielgruppe: Anwender aus dem Fachbereich
  - Vermehrt grafische Regelmodellierung
- Einbetten der Ereignisverarbeitungsfunktionalität [7]
  - Anteil an standalone Systemen schrumpft
  - Funktionalität wandert in Anwendungen des Fachbereichs

Ausblick

Ausblick Master

- Proactive Event Processing (PEP)[1,7]
- Nicht nur auf Situationen reagieren
- Aktives Vorausschauen und Eingreifen
- Unerwünschte Situationen vermeiden bzw. Folgen mildern
- Fragestellungen:
  - Wie kann man einem System erwünschte bzw. unerwünschte Situationen mitteilen?
  - Wie kann das nächste (die nächsten) Ereignis(-se) berechnet werden?
  - Wie können die zu ergreifenden Maßnahmen berechnet werden?
- Demand Side Management mit PEP realisieren

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Quellen

Paper

[1] Engel, Y.; Etzion, O. : **Towards Proactive Event-Driven Computing**
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[2] Luckham, D. C. ; Frasca, B. :
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[4] Teymourian, K.; Paschke, A. : **Towards Semantic Event Processing**
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[5] Teymourian, K.; Streibel, O.; Paschke, A.; Alnemr, R.; Meinel, C. :
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Bücher

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[8] Luckham, D. C. :
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[9] Mühl, G.; Fiege, L.; Pietzuch, P. : **Distributed Event-Based Systems**
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Quellen

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[10] **The Complex Event Processing Blog** http://www.thecepblog.com/

Vielen Dank für die Aufmerksamkeit!

Fragen?