Seminar
Autonome DatenBankSysteme

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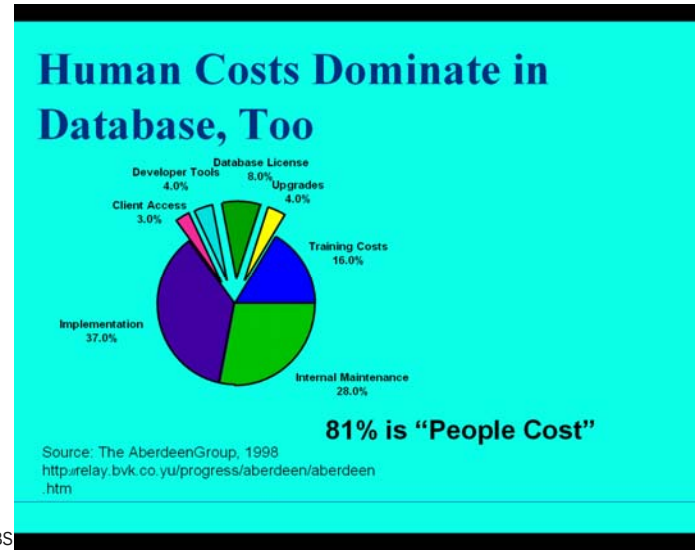
Datenbanken und Informationssysteme

Folie aus VLDB'04-Tutorial:
Self-Managing Technology in Database Management Systems,
S. Chaudri, Microsoft; B. Dageville, Oracle; G. Lohman, IBM

Motivation (1)



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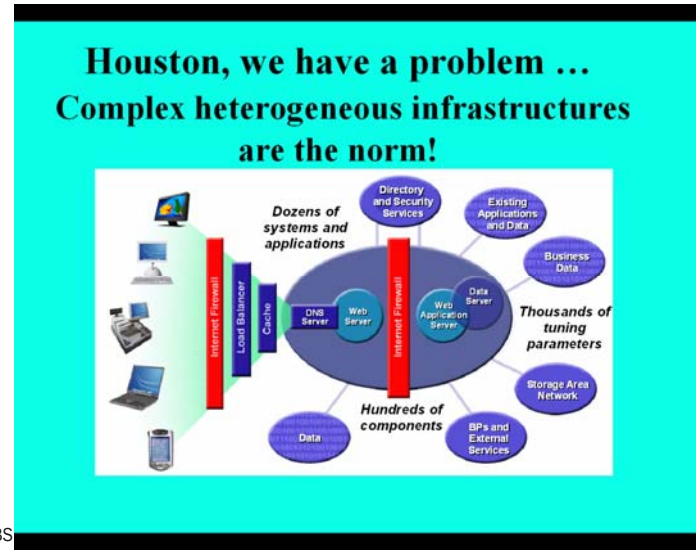
Motivation (2)



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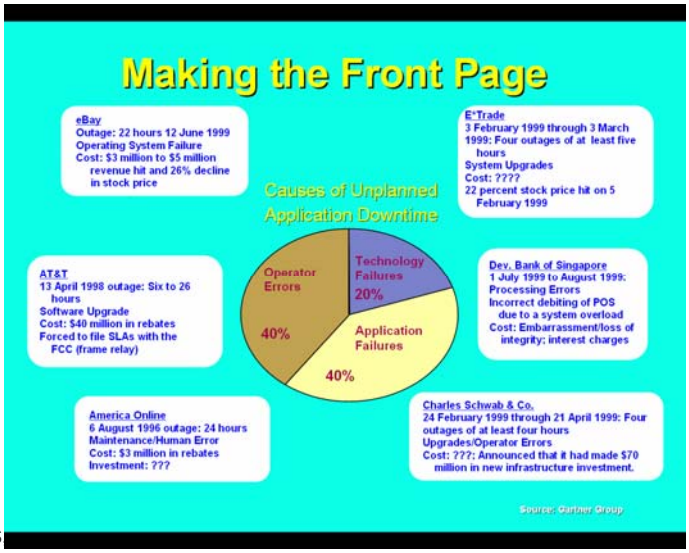
Motivation (3)



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Motivation (4)

Reducing the TCO

- Management costs a major part of total IT spending
  - Cost of HW decreasing while cost of managing systems is increasing
  - IT System form core of business today
    - Customers and suppliers deal directly with IT systems over the web
    - Reliable IT Infrastructure is critical to success
    - ☞ IT Performance = Business Performance
  - Increased reliance on IT and explosion in data volume require more administrative staff
  - Limited availability of skilled labor results in spiraling DBA salary
- Increased business competitiveness requires reduction in operating expenses
  - ☞ IT Managers being asked to do more with less $$

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Motivation (5)

Does this look familiar?

"If it's so efficient, why doesn't it fix itself?"

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Motivation (6)

Managing Increasing Complexity

- Increase in Complexity & Size of Applications
  - Database workloads are more mixed (e.g. OLTP and complex reporting).
  - Database workloads are more dynamic.
  - Data size is growing rapidly
    - ☞ Multi-terabytes are no longer the exception!
- DBMS vendors have responded to these challenges by
  - Enlarging the scope of existing features
    - New access structures, complex optimizations
    - Complex hardware architectures like clusters or MPPs
  - Adding new features in the server
    - Objects, XML, OLAP, data mining, ETL
    - Replication, high-availability, …

☞ Managing/tuning a modern database system requires a very high degree of expertise!

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Motivation (7)

The Idea

Wouldn't it be great if your
Database (and entire system!)
were as easy to maintain
and as self-controlled
as your
refrigerator?

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Motivation (8)

What Is The Self-Managing Vision?

- **"Intelligent" open systems that…**
  - § **Manage complexity**
  - § **"Know" themselves**
  - § **Continuously tune themselves**
  - § **Adapt to unpredictable conditions**
  - § **Prevent and recover from failures**
  - § **Provide a safe environment**

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Motivation (9)

Huge Scope of DBA Responsibilities

- Initial Design & Layout
  - Hardware configuration
  - Logical database design
  - Physical data layout (partitioning, allocation to nodegroups, clustering)
  - Auxiliary data structures (indexes, view materializations)
  - Configuration parameters (hundreds!)
  - Security policies, groups, userids
- Dynamic Monitoring & Adjustment
  - Database statistics to collect and when
  - Clustering and Reorganization
  - Memory allocation, esp. buffer pool sizes
  - System / query status
  - Problem determination (deadlocks, bad plans, …)
  - Visualization of all the above

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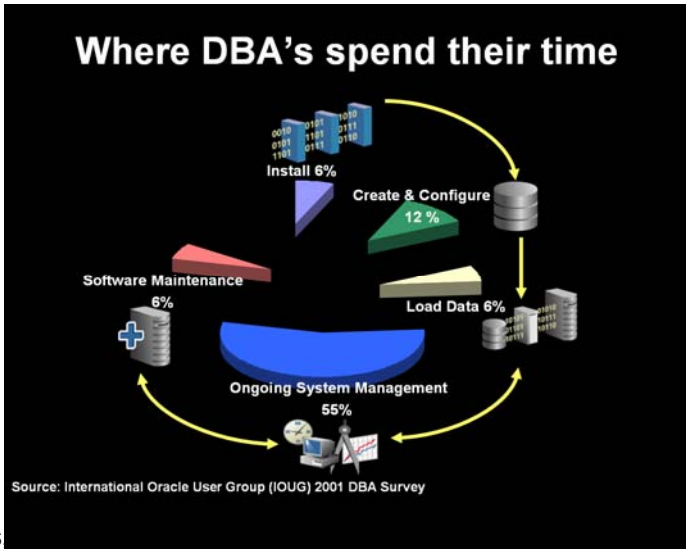
Motivation (10)



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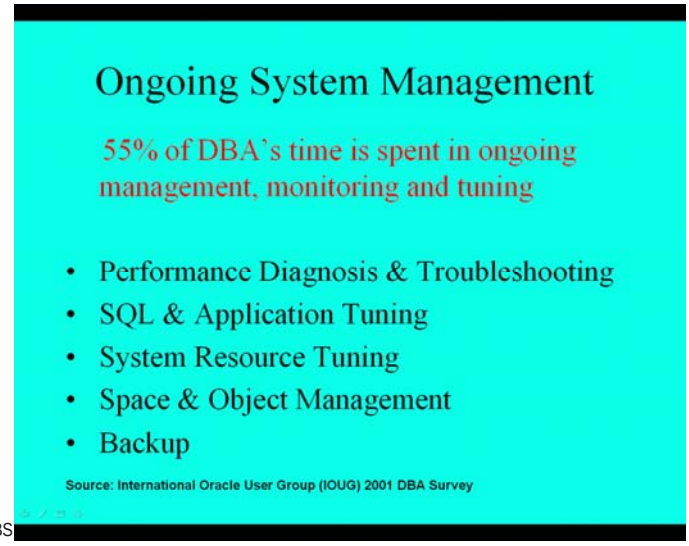
Motivation (11)



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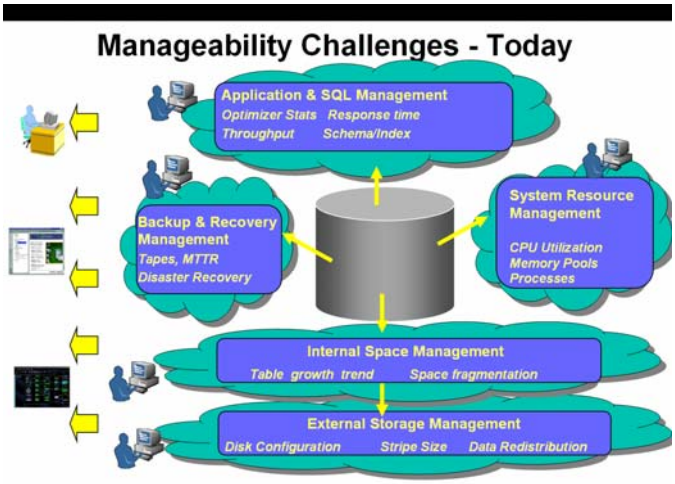
Motivation (12)



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Motivation (13)

Core Capabilities for Enabling Self-Managing Systems

- Problem Determination
- Common System Administration
- Adaptive Monitoring
- Solution Install
- Policy-based Management
- Complex Analysis
- Heterogeneous Workload Management

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Motivation (14)

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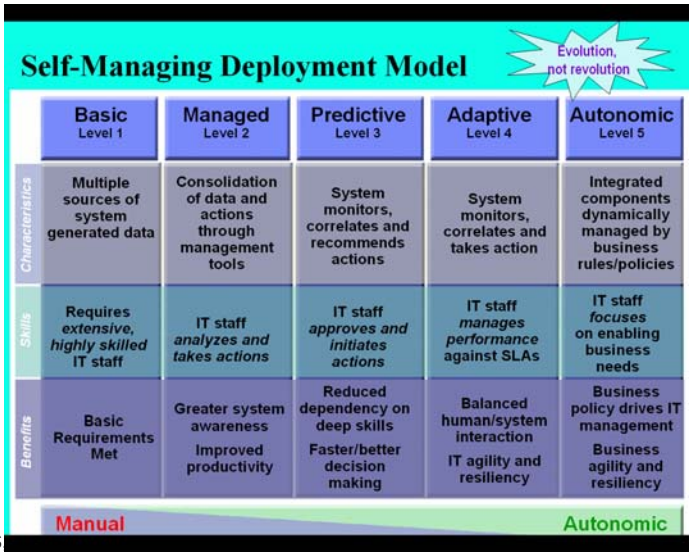
Motivation (15)



Ziele des Seminars ADBS

- **Die Bedeutung autonomer Mechanismen in DBS verstehen**
- **Autonomie-Grade und Machbarkeit abschätzen können**
- **Autonomie-Eigenschaften führender DBMS kennen lernen**
- **Autonomie-Grade existierender DBMS vergleichen können**
- **Wissenschaftliche Texte erarbeiten und Inhalte aufbereiten können**
- **Wissenschaftliche Texte verfassen können**
- **Wissenschaftliche Inhalte präsentieren können**
- **Wissenschaftliche Diskussionen führen können**

http://sites.computer.org/debull/A06sept/issue1.htm

Basis-Literatur


Bulletin of the Technical Committee on

Data Engineering

September 2006 Vol. 29 No. 3 IEEE Computer Society

Letters

Special Issue on Self-Managing Database Systems

Themen(blöcke)

1	23.10.2006	Motivation, Organisation, Themenvergabe	N. Ritter
2	30.10.2006	fällt aus; aber 31.10.06, 14:30: Themenverfeinerung 4 und 5	N. Ritter
3	06.11.2006	Autonome Datenbanksysteme – Überblick; Themenverfeinerung (6,7,8) und (9,10,11)	N. Ritter
4	13.11.2006	Autonome Services	Schulz
5	20.11.2006	Self-* Storage	Rinneberg
6	27.11.2006	Autonomic IBM DB2	Hinkelmann
7	04.12.2006		Buttkus
8	11.12.2006		Voigt
9	18.12.2006		Haasenleder
10	08.01.2006	Autonomic Microsoft SQL Server	Okroj
11	15.01.2006		Von Fintel
12	22.01.2007		Maniseng
13	29.01.2006	Autonomic Oracle	Lipinski
14	05.02.2006	Vergleich	Alle Teilnehmer

Organisatorisches (1)

- Verfeinerung der Themenblöcke ((6,7,8) und (9,10,11))
  - Vorschlag durch die Teams selbst
  - Vereinbarung/Festlegung in 3. Treffen
- Ausarbeitung
  - 8-10 Seiten pro Vortrag, Template auf der Seminar-Web-Seite
  - Abgabe: 1 Woche vor Vortrag!
  - Veröffentlichung auf Seminar-Web-Seite
- Vortrag
  - Dauer des (reinen) Vortrags: ~ 1 Stunde (mindestens 50 Minuten!)
  - danach Diskussion
    - der Inhalte und
    - der Güte des Vortrags an sich
      - Kriterien: Vortragsstil, Foliengestaltung, Klarheit der Darstellung, Verständlichkeit, Tiefgang, Nutzung von Beispielen, Kompetenz in der Fragenbeantwortung, etc;
      - schriftliche Bewertung durch alle Zuhörer anhand vorgegebener Kriterien

Organisatorisches (2)

- Vergleich der Autonomie-Eigenschaften
  - Schriftliche, stichwortartige Vorbereitung (1-2 Seiten) durch alle Teilnehmer
  - Gemeinsame Diskussion
  - Schriftliche Ausarbeitung durch Teilnehmer (einzeln, gemeinsam oder in Gruppen?)
  - Veröffentlichung auf der Seminar-Web-Seite

http://vsis-www.informatik.uni-hamburg.de/teaching/ws-06.07/adbs/