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Les Benchmarks pour les services Web

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When you can measure what you are speaking about, and express it in numbers, you know something about it; but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meager and unsatisfactory kind; it may be the beginning of knowledge, but you have scarcely in your thoughts advanced to the state of Science, whatever the matter may be.

Lord Kelvin, 1883

Qu'est ce qu'un Benchmark ?

- **Benchmark**
 - **Banc de Performances**
 - Mesurer les performances d'un système (matériel / logiciel) sous une charge de travail caractérisant une application type.
 - Cette application peut être définie selon des spécifications écrites par des organismes compétents
- **Intérêt**
 - fournir un indicateur fiable et global de qualité des produits
 - comparer les produits entre eux (avec d'acheter)
 - fournir des arguments commerciaux
 - Dimensionner son système en fonction de ses besoins
- **Remarque : ATTENTION**
 - à l'écart entre Application Réelle et Application «Modèle»

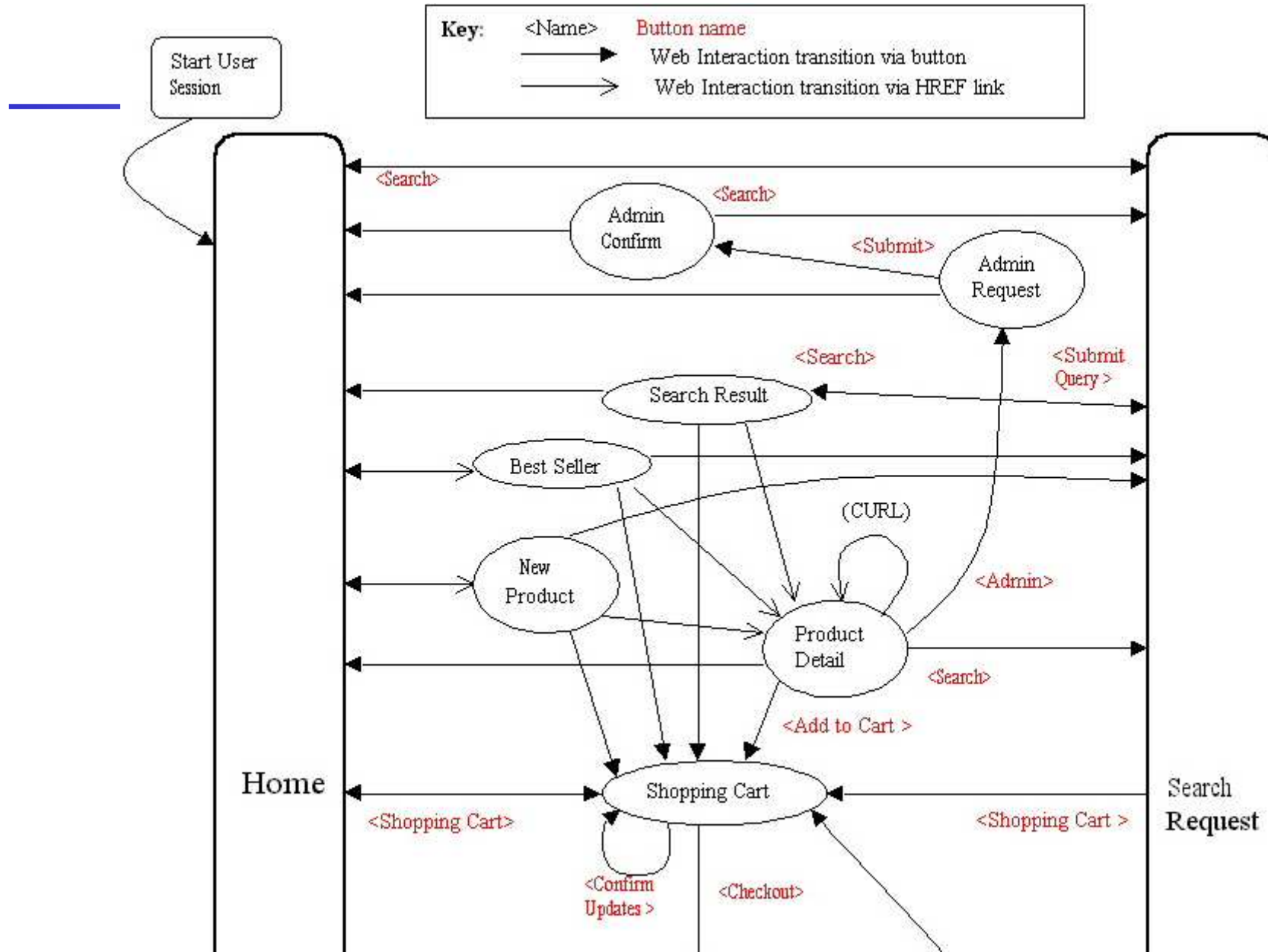
TPC-W (i)

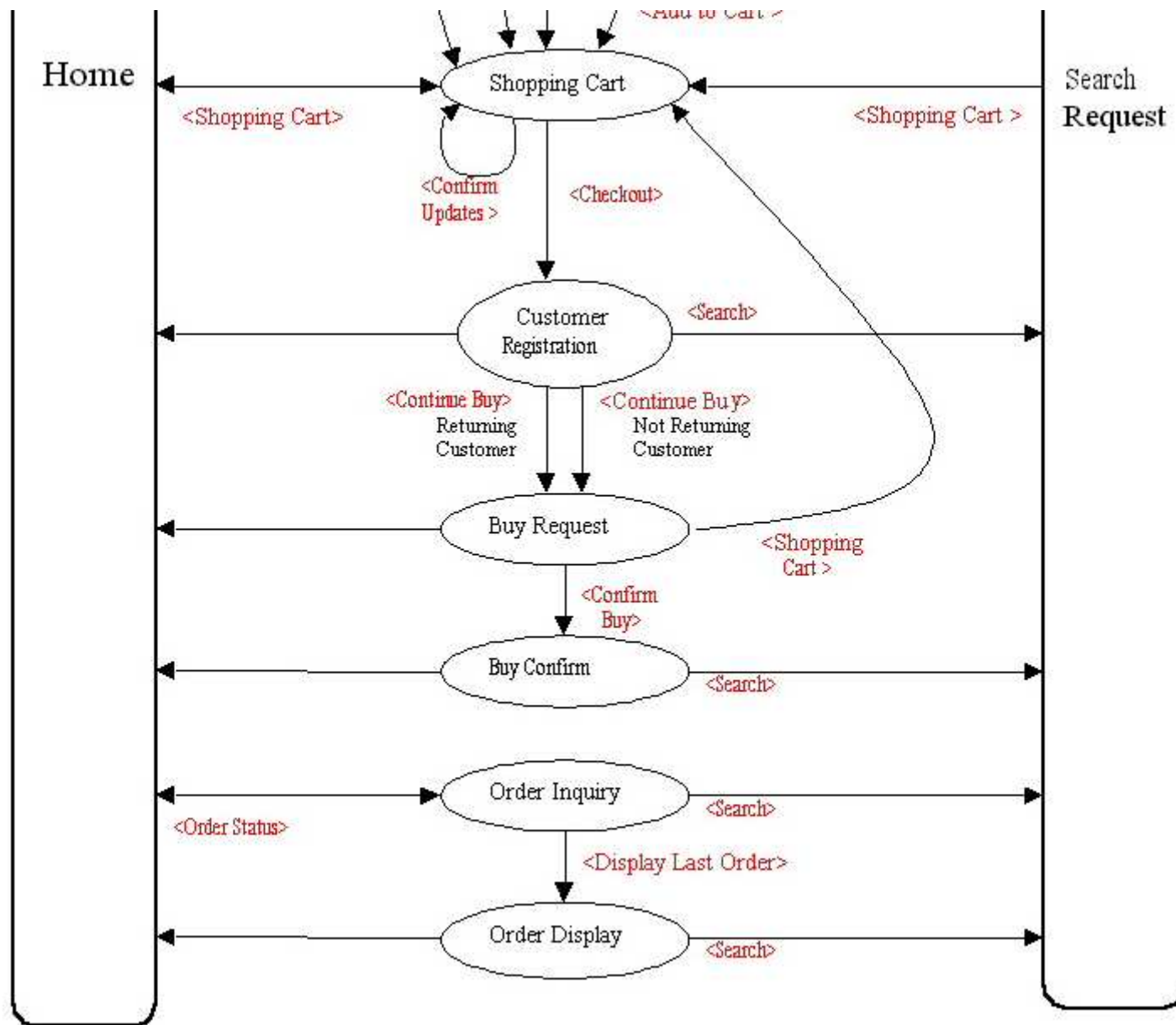
- Motivation
 - environnement Web avec de la génération de page dynamique et du transactionnel sécurisé (SSL).
- Application
 - « Browse\ Search \Shopping Cart\ User Registration\ Buy\Order » dans un « online bookstore »
 - Variables (SF) : taille de données et nombre d'utilisateurs
- Voir
 - <http://www.tpc.org>
 - <http://www.ece.wisc.edu/~mikko/tpcw.html>
- Désormais obsolète depuis 28 Avril 05
 - Remplacé par TPC-App

TPC-W

Architecture

- **REB (Remote Emulator Browser)**
 - simule un client qui Browse\ Search \Shopping Cart\ User Registration\ Buy
- **Serveur Web**
 - Pages dynamiques
 - Bases de données relationnelles composé de 8 tables
 - Système de population de la base de données (WGEN.exe)
 - Pages Statiques
 - Description de l'interface web pages après pages.
 - Définition du poids (5k, 10k, 15k, 20k, 25k) des images selon le format (Last.exe)
- **PGE (Payment Gateway Emulator)**
 - simule la partie Order





TPC Web Commerce Benchmark (TPC-W)



Home Page

Welcome back **John Doe**

Click on one of our latest books to find out more !



What's New

Best Sellers

ARTS	NON-FICTION
BIOGRAPHIES	PARENTING
BUSINESS	POLITICS
CHILDREN	REFERENCE
COMPUTERS	RELIGION
COOKING	ROMANCE
HEALTH	SELF-HELP
HISTORY	SCIENCE-NATURE
HOME	SCIENCE-FICTION
HUMOR	SPORTS
LITERATURE	TRAVEL
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[Shopping Cart](#) [Search](#) [Order Status](#)

TPC-W (mesures)

- Web interaction
 - traitement par le serveur (HTTP+SGBD)
de la réception d'une requête jusqu'à la réponse
 - pas de coût réseau
- Mesures
 - WIPS : Web interactions per second
 - \$/WIPS : coût (matériel+logiciel+maintenance) du WIPS
 - 123\$/WIPS@10000
 - Coût (matériel+logiciel+maintenance) en \$ du WIPS
 - @ Nombre d'articles dans la base de données
- Mesures Additionnelles
 - Web Interactions Per Second-**B**rowsing (WIP**S**b)
 - Web Interactions Per Second-**O**LTP (WIP**S**o)

Benchmarks pour EJB

- Architecture J2EE complète ou serveur EJB seul
 - J2EE=Servlet/JSP + EBJ + SGBD R(/OO/OR)
- Modèle d 'Application / Modèle de Données
 - ??? basé sur TCP/x ???
 - Session Bean ??? / Entity Bean ???
- Mesures
 - ??
- Outils
 - ECPperf, *SunSoft*
 - <http://java.sun.com/j2ee/white/ecperf.html>
 - *Université Charles, Prague*
 - <http://nenya.ms.mff.cuni.cz/>
 - SPEC JAppServer
 - TPC-App

ECPerf (JSR 4)

<http://ecperf.theserverside.com/ecperf/index.jsp>

- Enterprise JavaBeans(EJB) benchmark
 - measure the scalability and performance of J2EE servers and containers.
- Workload
 - stresses the ability of EJB containers to handle the complexities of memory management, connection pooling, passivation/activation, caching, etc.
 - Do not address
 - GUI, presentation, DBMS scalability (e.g., database I/O, concurrency, memory management, etc.).
- Specification and Kit
 - developed under the Java Community Process.
 - The audience is both the J2EE user and server vendor.

The Standard Performance Evaluation Corporation (SPEC)

- Non-profit corporation
 - establish, maintain and endorse a standardized set of relevant benchmarks
 - publish results
- Benchmarks SPEC-^{*}
 - Java servers : JAppServer2002 , JAppServer2004, JBB2005
 - Mail servers: MAIL2001, SPECimap
 - NFS servers : SFS97_R1
 - Web servers : WEB2005, WEB99, WEB99_SSL

SPEC JAppServer

- Orienté serveur J2EE de classe entreprise
- JAppServer2002
 - centré EJB
- JAppServer2004
 - étendu aux WAR, RAR, ...

SPEC JBB2000

<http://www.spec.org/osg/jbb2000>

- SPEC JBB2000 (<http://www.spec.org/osg/jbb2000/>)
 - SPECjbb2000 (Java Business Benchmark) is SPEC's first benchmark for evaluating the performance of server-side Java. Joining the client-side SPECjvm98, SPECjbb2000 continues the SPEC tradition of giving Java users the most objective and representative benchmark for measuring a system's ability to run Java applications.
 - Emulates a 3-tier system, the most common type of server-side Java application today.
 - Business logic and object manipulation, the work of the middle tier, predominate.
 - Clients are replaced by driver threads, database storage by binary trees of objects.
 - Increasing amounts of workload are applied, providing a graphical view of scalability.

SPECweb2005

<http://www.spec.org/web2005/>

- SPECweb2005
 - evaluating the performance of World Wide Web Servers.
 - successor to SPECweb99 and SPECweb99_SSL
- Features and Workload
 - Measures simultaneous user sessions
 - Relevant dynamic content: PHP and JSP implementations included
 - Page images are requested using 2 parallel HTTP connections
 - Multiple, standardized workloads: Banking (HTTPS), E-commerce (HTTP and HTTPS), and Support (HTTP); agreed to by major players in the WWW market
 - Simulates browser caching effects by using If-Modified-Since requests
 - File accesses more closely matching today's real-world web server access patterns
 - Full disclosures available on this web site
 - Stable implementation with no incomparable versions
 - Java-based client for cleaner, more portable code

SPEC MAIL2001

<http://www.spec.org/mail2001/>

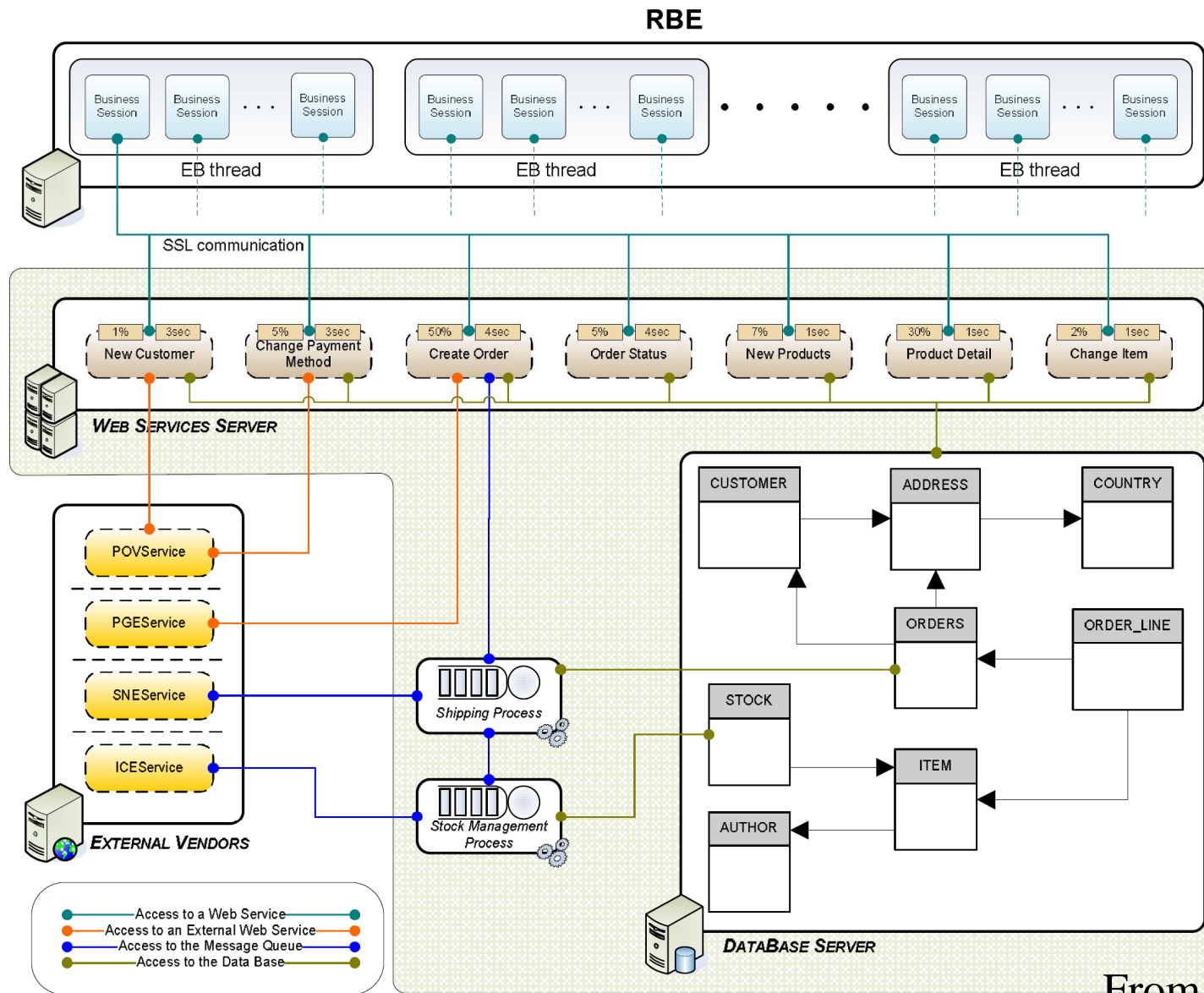
- SPECmail2001 is a standardized mail server benchmark designed to measure a system's ability to act as a mail server servicing email requests, based on the Internet standard protocols SMTP and POP3. The benchmark characterizes throughput and response time of a mailserver system under test with realistic network connections, disk storage, and client workloads. The benchmark focuses on the ISP as opposed to Enterprise class of mail servers, with an overall user count in the range of approximately 10,000 to 1,000,000 users.
- Remark
 - SPECimap (Currently under development by SPEC)
 - measure the performance of corporate e-mail servers (SMTP and IMAP4)

TPC-App

http://www.tpc.org/tpc_app

- TPC-W successor
- Application server and web services benchmark
- Workload
 - Activities of a business-to-business transactional application server operating in a 24x7 environment
 - application server products, messaging products, and databases
 - Workload Characterization
 - Multiple on-line business sessions
 - Commercially available application environment
 - Use of XML documents and SOAP for data exchange
 - Business to business application logic
 - Distributed transaction management
 - Reliable and durable messaging
 - Dynamic web service response generation with database access and update
 - Simultaneous execution of multiple transaction types that span a breadth of business functions.
 - Databases consisting of many tables with a wide variety of sizes, attributes, and relationships
 - Transaction integrity (ACID properties)

TPC-App General Layout

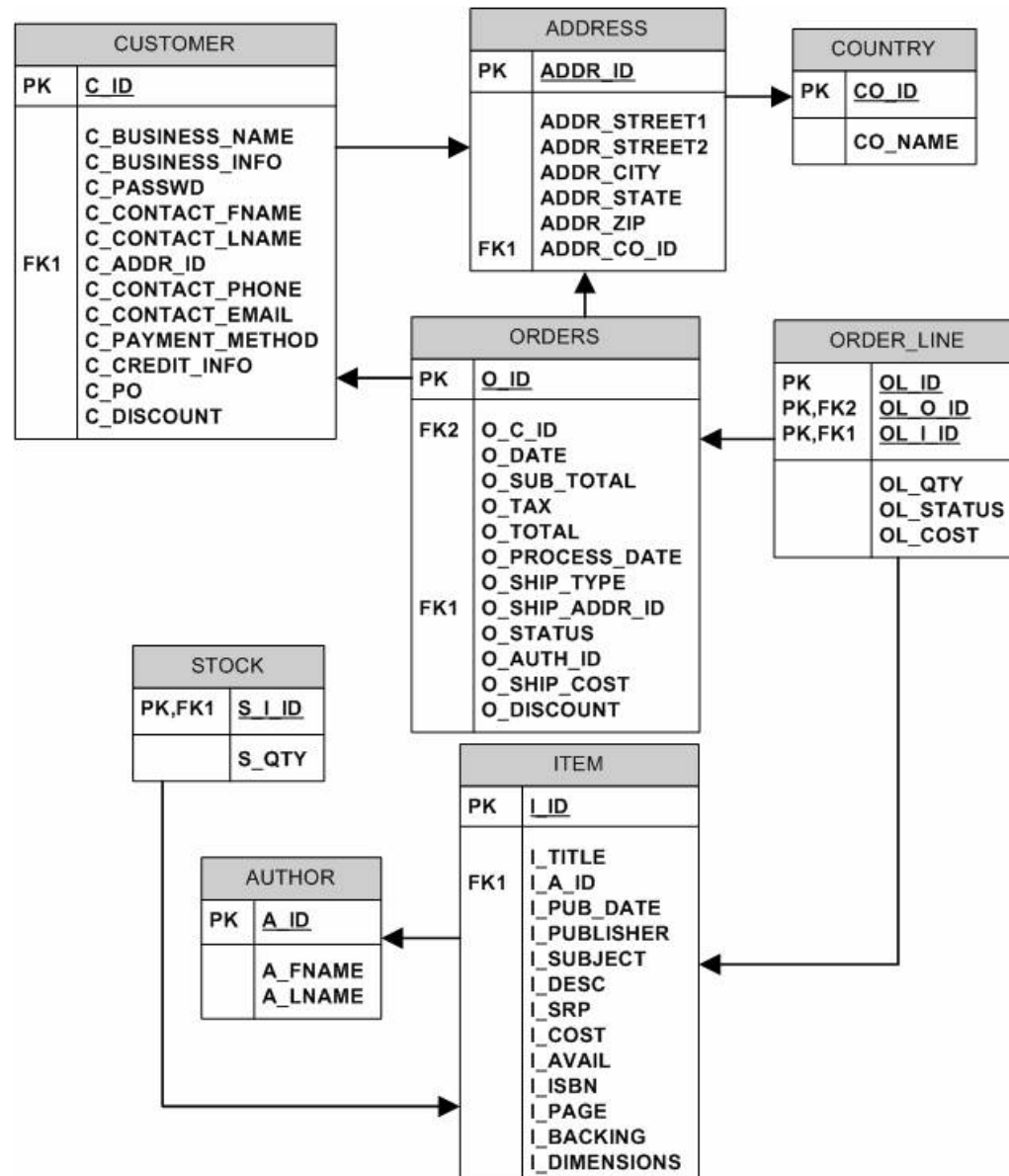


Didier Donsez, 1998-2010, Benchmarks pour les services Web

SUT

From [Garcia06]

TPC-App Database Schema



TPC-App

http://www.tpc.org/tpc_app

- Metrics
 - SIPS (System Interaction Per Second)
 - **Total SIPS, SIPS/server, \$/SIPS**

TPC-App

http://www.tpc.org/tpc_app

■ References

- Daniel F. García, Javier García, Manuel García, Ivan Peteira, Rodrigo García, Pablo Valledor, BENCHMARKING OF WEB SERVICES PLATFORMS, An evaluation with the TPC-App benchmark, International Conference on Web Information Systems and Technologies (WEBIST'2006), 11-13 April 2006, Setubal, Portugal, http://www.tpc.org/tpc_app/articulo.pdf

Storage Performance Council (SPC)

<http://www.storageperformance.org/>

- non-profit corporation
 - define, standardize and promote storage system benchmarks and to disseminate objective, verifiable performance data to the computer industry and its customers.
- Benchmarks
 - SPC-1
 - emulate multi-user I/O applications such as database/OLTP and mail applications.
 - demonstrate the performance of a storage subsystem (SAN) in these environments and is delivered by an SPC workload generator.
 - SPC-2 (public review)
 - represents a segment of applications characterized by predominately large I/Os organized into one or more concurrent sequential patterns such as Large file processing, Large database queries (datawarehouse, OLAP), Video on demand
 - SPC-3

Autres

- A. Rousskov and D. Wessels, “High-Performance Benchmarking with Web Polygraph,” *Software Practice and Experience*, vol. 34, no. 2, 2004, pp. 187–211.

Bibliographie

- The Benchmark Gateway
 - <http://www.ideasinternational.com/benchmark/bench.html>

- TODO
 - Wisconsin Commercial Workload Suite
 - <http://www.cs.wisc.edu/multifacet/>
 - Performance of Commercial Workloads
 - <http://research.compaq.com/wrl/projects/Database/>

Cours reliés

- cours « Benchmarks pour les BDs »
 - <http://membres-liglab.imag.fr/donsez/cours/bdbench.pdf>
- Cours « le protocole HTTP et les serveurs Web »
 - <http://membres-liglab.imag.fr/donsez/cours/http.pdf>