	DBench
	Dependability Benchmarking
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Dissemination and Use Plan

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Dissemination and Use Plan

Authored by: D. J.G. Costa[+] and J. F.V. Carreira[+]

With the contribution of: P. Gil[◆ ◆], W. Hohl[◆], K. Kanoun[*], H. Madeira[++], J. J. Serrano[◆ ◆] and N. Suri[**]

* LAAS   ** Chalmers   [+] Critical   [++] FCTUC   [◆] FAU   [◆ ◆] UPVLC

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Abstract

Dissemination is a fundamental activity in any research process. The success of dissemination activities contributes decisively to the short and long term success of a research project – as measured by knowledge usage by external entities and degree of adoption in the industry. Careful and earlier planning of dissemination activities is then of utmost relevance. This document presents the first iteration of the DBench dissemination and use plan. It addresses the basic dimensions in the dissemination framework: target users, content to be delivered, the sources to carry out the contents and the media to be used to deliver the message. An analysis and segmentation of the users domain is presented. Dissemination content is outlined and each item is associated with its prime user group. Primary and secondary sources are listed together with each preferred user group. The media mix selection is also presented. At last, an assessment is made on the dissemination activity made so far and a short term plan is presented.

1. Introduction

1.1 Purpose

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dis·sem·i·nate
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Etymology: Latin disseminatus, past participle of disseminare, from dis- + seminare
to sow, from semin-, semen seed
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1: to spread abroad as though sowing seed <disseminate ideas>
2: to disperse throughout
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In the research literature, the term *dissemination* is most of the time associated with the diffusion of information or knowledge. *Knowledge utilization*, *technology transfer* and other terms are sometimes used with the same meaning, other times employed to emphasize the use of the information (in addition to simple possession).

This report addresses both dimensions - spread and effective utilization – of the dissemination effort to be applied on DBench project outcomes[1]. Throughout this document, and for the sake of simplicity, the term *dissemination* will be used alone to address both aspects. Furthermore, our use of the term *dissemination* refers to a broad understanding as suggested in [Klein 1991]:

- *spread*, which is defined as "the one-way diffusion or distribution of information,"

- *choice*, a process that "actively helps users seek and acquire alternative sources of information and learn about their options,"

- *exchange*, which "involves interactions between people and the multidirectional flow of information," and

- *implementation*, which "includes technical assistance, training, or interpersonal activities designed to increase the use of knowledge or R&D or to change attitudes or behavior of organizations or individuals."

1.2 Scope

This report focus on the research dissemination and technology utilization fostering activities to be carried out in the DBench project, in the aim of Work Package 7. As being the first of a series of iterations in the planning process, it sketches the main directions for the 3 year period. Furthermore this report presents concrete goals to be achieved in the 2nd semester of 2001 and lists the achievements already made in the first semester of the project.

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[1] The inclusion of the wording *"Dissemination and use"* in the title of this report is a categorical statement of that purpose.

1.3 Structure

Section *2 Goals* and *Objectives* gives an overview on the goals of the DBench dissemination effort.

Section *3 Users* describes the foreseen profile of each class of recipients for the dissemination and use activities.

Section *4 Content Identification* enumerates the basic content types to be disseminated to the potential user groups.

Section *5 Sources* identifies candidate primary sources and planned activities to enlarge the actual set as well to enroll those sources in the dissemination effort.

Section *6 Media* discusses the potential channels through which the content is to be delivered.

Section *7 Achievement Status and Short Term Plan* makes an assessment of the first 7 months of dissemination and planning activities and lists the activities to be performed until the next planning iteration – December 2001.

1.4 Acronyms

For the sake of simplicity the following acronyms will be used in this document.

Acronym	*Description*
AdI	*Agência de Inovação,* Portuguese government "arm" for technology transfer and inovation initiatives.
CMU	Carnegie Mellon University
DASIA	DAta Systems in Aerospace, http://www.eurospace.org/conferences.html
DSN	International Conference on Dependable Systems and Networks http://www.dsn.org
ECSS	European Cooperation for Space Standardization, http://www.estec.esa.nl/ecss/
EDCC	European Dependable Computing Conference, http://www.inf.mit.bme.hu/edcc3/
ESA	European Space Agengy, http://www.esa.int
ESI	European Software Institute http://www.esi.es/
ESTEC	European Space Research & Technology Centre, http://www.estec.esa.nl
EUROSPACE	Association of European space industry, http://www.eurospace.org
FAU	Friedrich Alexander University
FCTUC	*Faculdade de Ciências e Tecnologia da Universidade de Coimbra*, Faculty of Sciense and Technology of the University of Coimbra, http://www.fct.uc.pt/
GSTF	Fault Tolerant Computing research Group (Valencia University)
HASE	Symp. on High Assurance Systems Eng.
HDCC	High Dependability Computing Consortium, http://www.cs.cmu.edu/hdcc/www/
ICDCS	International Conference on Distributed Computing Systems, http://cactus.eas.asu.edu/ICDCS2001
IFIP TC 10	International Federation for Information Processing, Technical Committee 10, Computer Systems Technology http://www.ifip.or.at/ http://www.dit.upm.es/~cdk/org/ifip/tc10.html
IFIP WG 10.4	Dependable Computing and Fault-Tolerance http://www.dependability.org/wg10.4/
IPN	*Instituto Pedro Nunes*, technology transfer organization associated with the University of Coimbra
ISSRE	International Symposium on Software Reliability Engineering http://www.issre2001.org/dates.html
IUG	"Internal" user group
LAAS-CNRS	*Laboratoire d'Analyse et d'Architecture des Systèmes du Centre National de la Recherche Scientifique*
LINUX-Tag	Linux and Open Source Exhibition, http://www.linuxtag.org
Nexus	http://www.nexus5001.org/
OLTP	Online Transaction Processing
RTSS	Real-Time Systems Symposium, http://rtss2001.sssup.it/
SEI	Software Engineering Institute, http://www.sei.cmu.edu
SIGDeB	IFIP WG 10.4 Special Interest Group on Dependability Benchmarking
SRDS	Symp. on Reliable Distributed Systems

TPC	Transaction Processing Performance Council, http://www.tpc.org
UPVLC	Universidad Politechnica de Valencia
USENIX	http://www.usenix.org/events/usenix02

2. Goals and Objectives

The DBench project will define a conceptual framework and an experimental environment for benchmarking the dependability of COTS and COTS-based systems. It will provide academia, system developers and end-users with means for 1) characterising and evaluating the dependability of a component or a system, 2) identifying malfunctioning or less weak parts, requiring more attention, 3) tuning a particular component to enhance its dependability, and 4) comparing the dependability of alternative or competing solutions. Final measurable objectives include the definition of concepts, specifications and guidelines for dependability benchmarking and a set of dependability benchmark prototype tools.

The primary DBench dissemination goal is to make these prototypes widely available (e.g., through the web whenever possible) to promote their adoption by an audience as wide as possible. Derived goals of DBench include then he improvement of computer's (including hardware and software) resilience to faults, even for general-purpose systems with no special fault tolerance mechanisms. Additionally, but this time a long term dissemination goal, is the adoption of benchmarking processes suitable as part of certification schemes of critical systems incorporating COTS components.

3. Users

The early identification of target users is of utmost importance. Users characteristics dominate the other dimensions in the knowledge utilization process: *content* should be formatted according to the user background and needs; the dissemination *source* must be relevant and credible from the user perspective; the *medium* selected for the delivery must be familiar to the intended user.

According to best practices in the dissemination of research results, the DBench project involves from the beginning a representative set of potential users – the members of the Advisory Board (AB) and a sponsor. This "internal" user group (IUG) constitutes then the first ring of dissemination, providing feedback and substantial interaction between research activities and intended users. A good estimation for post-project dissemination success will be the adoption of project outcomes within this internal user group.

Another important aspect is to decide on the size of the user audience that can be addressed effectively. Some authors state that "the larger the number of recipient organizations aimed at, the lower the resulting impact is likely to be" [Dentler 1984]. Our option is to concentrate on a small set of users for the 3-year project period and plan to target a broad audience afterwards.

As a reflection of the dissemination work done during proposal preparation time, the project partners and the IUG are a good starting point for *audience segmentation* across several dimensions. The following two sections address segmentation in the two basic user groups: academia and industry.

3.1 Academia

The average academic user will range from MSc or Phd students, to post-doc researchers in labs and universities, to professors and students of system/computer engineering degrees. The main research domain is dependability evaluation, either with focus on modeling or experimental evaluation. In terms of teaching domains, and besides the already mentioned research areas, it is highly expectable that system engineering courses crossing the DBench application areas – transactional database applications and embedded applications – will make use of the prototype benchmarks for teaching purposes. Performance benchmarks (e.g. TPC) are used in many universities to teach database tuning and performance optimisation.

This user group can be further subdivided in two user groups: *researchers* (A1) and *scholars* (A2). A distinctive characteristic of the A1 group is that its members already possess a good communication context – they are either expert researchers in the field (or neighbor fields) or are working close with at least one such expert. A1 users are more prone to exploit the project outcomes in terms of:

- Applying/reusing the dependability benchmarking on other application domains or make use of the conceptual framework to evaluate other non-functional properties not addressed in DBench (e.g. reusability, safety, security, etc.).

- Exploiting the dependability benchmarking framework for dependability verification & validation based research work.

Scholars (the A2 group), comprising both teachers and students, are more likely to take advantage of the more "end-user" like outcomes of the project, notably the prototype benchmarks. For instance, a prototype dependability benchmark toolset for a database application or an operating system, as the ones defined in [CF2 2001], can be designed in such a way to become effective for teaching and learning activities. For this specific example, the exploitation might be targeted both at:

- teachers/students of dependability introductory courses, providing a "live" mean of capturing product features and dependability attributes (integrity, availability, error detection, recovery, etc) whose underlying rationale is often very difficult to picture out only by theoretical means;

- teachers/students of advanced database/system engineering courses looking for a lab toolset that can provide useful insight on OTS operating system/database design tradeoffs towards enhanced dependability.

3.2 Industry

The universe of industry users for DBench, broadly speaking, includes anyone who is involved in managing, engineering, development, maintaining, analysing, consulting, or buying OTS based products, or projects with dependability concerns. As already mentioned the dissemination effort for DBench will be concentrated in first place on the internal users group. While this option might be seen at first glance too restrictive, it represents the best balance between feasibility and size of the user group.

Looking at the composition of the DBench IUG, this user group can be further segmented along the following dimensions:

- Application domain: transactional database applications vs embedded real-time applications.

- IT Market segment: DBMS & ERP, Operating system, Aerospace & defence.

- Life Cycle/User perspective: system developer, integrator, consultant and buyer.

"Life Cycle/User perspective" is perhaps the dimension that most contributes for a sharp segmentation. In a similar way to the discussion held for the academy users group, a decreasing level of communication context can be observed going from *system developer* to *integrator* classes, and then to *consultant* and *buyer*. As the academia A1 class, system developers will be probably eager to reuse the DBench framework for system modelling and experimentation activities. It should be stressed, however, that the above does not imply that system developers will not be interested in DBench "end products" like benchmarks and associated results. On the contrary, comparison of benchmark results of competing products/solutions with their own will be a major driving factor to use DBench framework for product assessment, tuning, and improvement.

Integrators share most of the background and needs of the *system developer* class. Two main aspects deserve separate attention:

- Focus on the selection of the "best-in-class" component for a particular set of requirements, including dependability aspects as well as cost, performance, etc. They will be much more benchmark practitioners (in the quantitative sense) than developers (which naturally will focus on their own system).

- Need for explicit and precise feedback on the target system weak points in order to engineer wrappers to accommodate it to the required dependability levels. The main difference regarding the developers class is that the observability and control of the systems under test is much more limited.

The consultants class are somehow halfway between integrators and buyers. They can act as intermediates in the "benchmark business", owning the benchmark tools and the knowhow and applying them to specific evaluation goals of end buyers. If we borrow the example of the Transaction Processing Performance (TPC) benchmarking "cluster" [TPC 2001], consulting activities are performed at two levels:

- Auditing – TPC's benchmark tests need to be supervised and its results confirmed by an auditor certified by the TPC council. While it is completely out of the scope of the DBench project to reach a similar level of operations, it is foreseen that consulting companies might exploit the DBench framework in a similar but more informal way.

- Consultation and training - database and system performance consulting services, including benchmarking, system tuning, troubleshooting, cluster configuration, training and system configuration.

The adoption of the latter kind of activities transposed to the dependability benchmarking area is clearly an achievable goal for DBench to the extent that an appropriate toolset is provided. Still, the DBench target user group is a small sized one, since it requires a basic understanding of the dependability milieu. It is expected – and this is a major outcome – that DBench will contribute for the increase on size and quality of this market niche.

System buyers represent the ultimate step in the value chain[3] of the "dependability benchmarking" environment. It is not clear at this point if system buyers are a primary user group, in the sense that DBench itself will promote dissemination of results, or rather a secondary user group that will benefit from dissemination through indirect channels (notably consultants). According to overall planning, during Working Package 3, benchmarks will be defined, prototyped and validated. The decision of including system buyers in the set of primary user groups shall be reached by answering the following questions:

- Are the benchmarks to be produced user-friendly? e.g., can we simply download them and obtain metrics in a few hours/days?

- Can the DBench planned experiments feed "consumer reports" [CR 2001] like analysis? Does the consortia have interest to further publish such kind of results?

It is expected that the dissemination and use plan will clear out this issue by end of year 2. The industry user groups will then be split in the following segments:

- I1 – System developers

- I2 – Integrators

- I3 - Consultants

4. Content Identification

Message content is another cornerstone dimension of any dissemination activity. Once the intended user groups are identified the ground is settled for planning content types. This subordination of

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[3] A value chain is an analysis model/tool of how businesses receive raw materials as input, add value to the raw materials through various processes, and sell finished products to customers. The concept was coined in [Porter 85].

[4] SMEs acting like mediators in the knowledge acquiring value chain, i.e., end users require them to help manage/configure project outcomes.

content to recipient is vital and recognizes one major content attribute– *comprehensibility*, i.e. to be effective the outcomes must be comprehensible to the intended users. Other attributes often cited in the literature "as likely to influence adoption" include: *economic advantage*, *compatibility*, *complexity*, *observability* and *trialability*. Interesting enough, *research quality* is not found to have a direct repercussion in adoption. According to [Huberman 1987] poorly conceived and executed studies "appear to do as well as the others (…) because research staff in the especially well-designed studies underinvest in dissemination work". At DBench, the balance between research and industry partners substantially mitigates this risk. In other words we are planning for both high quality research and high dissemination levels.

The DBench formal deliverables [Proposal 2000] already provide a comprehensive set of materials that can be used *as is* for the dissemination activities. This is particular applicable when addressing the Academia user groups but also applies to Industry audience, at least for deliverables CD1-*Benchmark Concepts, Specifications and Guidelines,* CD2-*Benchmark Demonstration,* CD3-*Dependability Benchmark Prototype tools* and TIP-*Technological Implementation Plan.* Nevertheless, and according to the target audience and dissemination medium, synthesis and *translation*[5] activities shall be carried on to accommodate raw content. The needed effort will vary with content and audience type. In the aerospace market, for instance, the acronym RAMS (Reliability, Availability, Mantainability, Serviceability) is best know instead of the term *dependability* – any content addressing specifically this market segment should consider these simple facts. Table 1 lists the content types planned so far together with its primary user groups (scored as *high interest*).

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[5] Translation is used in the sense of converting from research context to dissemination and use context.

Dissemination and Use Plan

Content Type	Interest	Academia		Industry		
		A1	A2	I1	I2	I3
Project Formal Deliverables	CF1, CF2, ETIE1-4, BDEV1-4	H	M	M	L	VL
	CD1, CD2, CD3, TIP	H	H	H	H	H
	PP (Project Presentation)	L	M	H	H	H
Research Papers		H	M	M	L	L
Technical papers		M	M	H	H	H
Benchmark Brochures	1 page illustrated brochure for each application domain: - OLTP - Embedded	VL	M	H	H	H
"Framework" Brochures	1 page illustrated brochure for each market segment - DBMS/ERP enterprise market - Aerospace & defense market - Embedded real time for automotive and on-board markets	VL	VL	H	H	H
Press releases	Short flashes announcing main milestones (debut, end of year 2, project completion)	VL	VL	L	H	H
MSc, Phd Thesis		H	H	M	VL	VL
Benchmark prototypes	Software binaries (abridged version from CD3)	M	H	M	H	H
Multimedia Presentations	Generic project presentation	M	M	M	M	H
	DBench generic/conceptual framework	H	M	H	M	L
	Process of performing benchmarks: one for each application domain	M	H	M	H	H
Executive Summary	1 page project presentation targeted at management positions (non-technical).	L	M	H	H	H

Legend:

A1 – Researchers; A2 – Scholars; I1 – System Developers; I2 – Integrators; I3 – Consultants;

H – High, M – Medium, L – Low, VL – Very Low

CF1 – State-of-the-art, CF2 – Preliminary Benchmark Framework

ETIE1 – Measurements, ETIE2 – Fault Representativeness, ETIE3 – Workload and Faultload Selection, ETIE4 – Description of the Selected Enabling Technologies

BDEV1 – Benchmark Definition, BDEV2 – Experiment Presentation, BDEV3 – Benchmark Experiments and Cross Exploitation of Results, BDEV4 – Benchmark Validation

CD1 – Benchmark Concepts, Specifications and Guidelines, CD2 – Benchmark Demonstration, CD3 – Dependability Benchmark Prototype tools,

TIP – Technological Implementation Plan.

Table 1 – Content types and user groups

5. Sources

Information sources play a paramount role in a dissemination effort. In an info-abundant Internet driven world, careful selection of sources is a decisive contribution to leverage the reach and acceptance of the message. It is well know that an audience considers both the source and the content (and not only the latter). Expertise and trustworthiness are among the traits most looked at in an information source.

The DBench consortium is a recognizable source of information *per si*. Its members are well known in the dependability research area and have established close links with industry as well. The members of the Advisory Board are the primary sources for disseminating DBench content into their organizations – they already know the internal lingo, are recognized as experts, and deemed as the most trustworthy sources one can find. Furthermore, it is expected that Advisory Board members will contribute in the dissemination effort within its own user group. This process reflects the well known effect Nevertheless, some other sources were already identified and this research will continue throughout the project. The remaining subsections address each source, describing potential users and secondary sources that were already identified.

5.1 Primary Sources

LAAS-CNRS

At LAAS, the Industrial Affiliates Program (IAP), created in 1990 offers a convenient way to disseminate information about DBench to interesting industrial partners. The IAP acts as a Technology and Science Watch organisation for the benefit of its company members. Its main interests are the dissemination and promotion of the lab's scientific and technological information (invitations to symposia, conferences, seminars, theses, etc,…), awareness raising to domestic and international research programmes, the opening of the documentation centre, the circulation of the lab's publications on a simple request, the organisation of specific events, the possibility of contacts and exchanges through Public Relations events.

LAAS has a long history of strong links with industry. In particular, LAAS hosts currently a joint Dependability Engineering Laboratory (LIS: Laboratoire d'Ingénierie de la Sûreté de Fonctionnement), which includes, in addition to LAAS itself, five large industrial companies: Aerospatiale Matra Airbus, Electricité de France, Matra Marconi Space France, Technicatome and Thomson-CSF. The second phase of LIS was terminate at the end of June 2000. It will be followed by a new organisation, the Dependability Engineering Network (RIS: Réseau d'Ingénierie de la Sûreté de fonctionnement), which will be open to other industrial and academic partners. RIS work will be organised in workshops and working groups dedicated to specific areas of dependability, and their conclusions will be made public.

The knowledge and expertise developed within the DBench project will be readily transferred to the companies involved in RIS, as well as with other companies with which LAAS has strong ties. These include the above mentioned "Industrial Affiliates Program" comprising a range of about 40 French and International companies and through contractual or consultancy activities, for example with France Telecom, Neurocom, and Rockwell-Collins France among others.

Critical

As dissemination actor Critical Software brings its experience with successful R&D exploitation. Within the technologies marketed by the company are two products that have emerged from R&D initiatives: Xception™ and WMPI™. Critical Software will play an active role in the exploitation plan. It will support and disseminate the benchmark during the project and after project completion. It will be responsible for the maintenance of the web site where the benchmark prototypes will be available and, when needed, promote their regular update.

While Critical's main role will be, most of the time, to plan and support dissemination activities, there are plenty of opportunities to act as source as well. Its activities in the US are a precious asset to target the US market.

Chalmers

Chalmers is a prominent participant in a Swedish government run technology transfer program called SSF/NUTEK. The program links academia with industrial partners through direct funding and corporate matching to foster strong interactions. Chalmers will be actively utilizing the base SSF program for dissemination of DBench related information to all SSF sites within Sweden.

Also, there is a Dependable & Real-Time Systems technology program called ARTES. Chalmers will utilize this vehicle for conducting DBench activity related seminars in the ARTES summer-schools, and industry/university workshops that are held every 3 months.

An industrial partner for the DBench project is Saab Ericsson Space, which will be an active participant and industrial disseminator. Saab will be providing application information for DBench activities to have a real industrial application component.

The Chalmer's group is a member of technology foundations and incubators (located in the Chalmers Technology Park) covering Volvo, Volvo Research Foundation, Saab AB, Saab Ericsson Space, Saab Automobile, Ericsson and ABB. Apart from direct dissemination of research (tools, techniques, seminars etc) to these industrial members, we plan to participate with seminars in the bi-annual technology workshops with these corporations. We will also be utilizing Chalmers industrial liaison program, called CIT, for dissemination of DBench results to the embedded/OS systems organizations within Sweden.

Chalmers participations in the IFIP SIGDeB and international conferences such as DSN (hosted by Chalmers over July 2001), RTSS, ICDCS will provide a forum for international level result dissemination as well.

FCTUC

The DSG (Dependable Systems Group) at the University of Coimbra brings an extensive record of successful projects in terms of technology transfer. Several spin-off companies had emerged from the group activities and it has been quite active in joint R&D projects with the Portuguese industry. Moreover, FCTUC brings specific ties with companies and organizations, both with suppliers and buyers, involved in the database management systems (DBMS) and web based applications market. Recently, these activities originated a companion database research group as well. FCTUC

will thus naturally play an important role as a source for delivering database centric benchmarking content to both Academic and the Industry User Groups.

FCTUC has also solid relationships with research promotion and technology transfer organizations, which can act as peer sources. The IPN (*Instituto Pedro Nunes*) is a technology transfer organization associated with the University of Coimbra. The shareholders include the University of Coimbra and a large set of industry partners. The IPN hosts several labs that perform joint R&D activities with the industry, including the Informatics and Systems Lab, and an incubator. FCTUC holds a large track of joint projects with the Informatics and Systems Lab and the lab is a natural stage to address industry shareholders. AdI (*Agência de Inovação*), the Portuguese government agency for technology transfer and inovation initiatives, is another candidate vehicle for DBench dissemination activities. FCTUC has been involved in several technology transfer initiatives sponsored by the AdI. FCTUC will exploit its contacts in both institutions for the purpose of DBench dissemination.

FAU

At FAU, the results of DBench will be presented at several international conferences to scientific authorities and at internal workshops to industrial researchers and Ph.D. students working for common projects. The existing connections to local companies as e.g. Caldera Deutschland (member of the Industrial Advisory Board), Lucent technologies, MID GmbH, and Siemens AG offer a broad base for the dissemination of ideas and results.

Also the recently at FAU established Graduate School "Interdisciplinary Design of Reliable Multi-Technology Systems" is a good way for information transfer. The main goal of this graduate research and study programme is the interdisciplinary design of dependable systems based on different technologies. Participating disciplines are electrical engineering, material sciences, and computer science. The main research topic is coupling and integration of the different modelling and design methods of the participating disciplines. This shall facilitate an integrated design that enables the validation of the system dependability by means of simulation and verification. The research program is completed by a study programme which extends the knowledge of the participants by common colloquia.

UPVLC

The CTT (Center for Technology Transference) of the UPVLC has the mission of supporting the research, the innovation and the dissemination of research results of this University. The Fault Tolerant Computing research Group (GSTF) is also a member of the Institute for the applications of information technology and advanced communications (ITACA – *Instituto de aplicaciones de las tecnologías de la información y de las comunicaciones avanzadas*). This institute has, besides of 5 research groups of the UPVLC, a set of Spanish communications and computer systems companies, as industrial partners. Tasks of this institute include research and technology transference in the information technology field.

In addition to this, the GSTF group is working in computer control automotive applications and has research agreements with Spanish (Nagares) and International (Lear) automotive companies. The

GSTF is also planning to disseminate the results of the project in Spanish scientific and technical events: national symposia, seminars, etc.

The contacts with the INDRA Company, that work in the military and aerospace field, as well as with the European research laboratory of Lear Automotive Spain, are two important targets for exploiting the research results of the DBench project. Moreover, the work done in collaboration by the Nagares Group (a Spanish company of electronic devices manufacturing for automotive systems) for the design of Electronic Control Units (ECUs) for the control of diesel engines are other possibilities for exploiting the work done in DBench project. The GSTF is the natural source to address this particular audience. The CTT and ITACA can be seen as potential secondary sources since they will also collaborate in the DBench exploitation of results.

5.2 Other Sources

Microsoft

Microsoft is a key player in the IT market. Industry user groups, and particularly integrators and consultants, are among the best audience for Microsoft acting as a DBench source. Interesting enough for some user groups, notably academia, Microsoft might no be seen as a credible source to address dependability. Brendan Murphy, Microsoft's representative in the area of dependability research, is a recognized source to disseminate DBench outcomes both internally at Microsoft, as well as in other forums.

Astrium

Astrium is a big player in the aerospace market. Together with Alenia Spazio and Alcatel Space they form the AAA ("the three As") group, which is a dominant stakeholder in the European Space market. Jean-Paul Blanquart, Astrium representative at DBench, is a recognized source for dependability design, validation and certification of aerospace systems.

Thales

Established in France more than a century ago, Thales is a global electronics company acting in the Aerospace, Defence, and Information Technology markets. Jean-Michel Meignien, the representative from Thales Technologies & Méthodes plans to disseminate DBench content on the Thales web Intranet as well as relay the main outcomes to the Thales internal work groups.

Saab Ericsson Space

Saab Ericsson Space is the joint venture of Saab and Ericsson for the space market segment. Saab's representative at DBench, Torbjorn Hult, has about twenty years of experience in the space business. He has worked with the main space computer systems in programmes like Ariane, Hermes and advanced deep space like Rosetta. His current position is as Chief engineer, being

responsible of product development and technical support for marketing activities. Torbjorn Hult is thus a credible source to address the space business community.

Indra

Indra Sistemas holds a strong portfolio in the military and aerospace markets. Miguel Bes Abizanga, Indra's representative at DBench AB, is an expert in the development of hardware and software for radar systems and has experience in the VxWorks Real Time O.S. of Windriver, Motorola's DSP and SPARC processors. Miguel Abizanga is a recognized source to deliver DBench outcomes in the embedded systems area.

Oracle

Oracle is naturally interested in getting and disseminating internally the outcomes of Dbench regarding the database application area. Fernando Maia, Oracle representative at Dbench AB, has taken several positions, namely as Technical Support Analyst and Sales Consultant, within the company. His activity since then has led him to work with all of Oracle technology products, namely the Oracle Server (versions 6, 7, 8 and 8i) with all of its components (Partitioning, Replication, Parallel Server, etc.). Presently, as Technical Account Manager in the Alliances Department, he is a recognized source of database technical information among Oracle clients and partners.

SIGDeB

The SIGDeB activities are very complementary to the ones DBench is pursuing. The Special Interest Group on Dependability Benchmarking (SIGDeB) was established in the summer of 1999 by the IFIP Working Group 10.4 on Dependable Computing and Fault Tolerance. The aim of the SIGDeB is to promote the research, practice, adoption, and dissemination of benchmarks for computer-related system dependability. Group membership consists of participants from universities, companies, and government agencies.

All the members of the DBench consortia are also members of the SIGDeB and most of them have been quite active in this forum. The SIGDeB chairmain (Phil Koopman, CMU) is also a member of the DBench advisory board and the vice-chair (Henrique Madeira, FCTUC) is a full partner of DBench. Furthermore, the SIGDeB has shown interest in closely follow the DBench activities.

From the DBench perspective, a partnership is highly recommend for a close cover of the industry user groups, notably for the user group *I1- System developers* due to the presence of a representative set of US based IT vendors, notably Compaq, IBM, Intel, Microsoft and Sun Microsystems, among others.

HDCC

The HDCC (High Dependability Computing Consortium) was recently formed under the auspicious of NASA Ames Research Center and CMU. The aim is to bring together US academia and industry to foster long-term research and education activities towards more dependable computing infrastructures. The list of industry founders is very diverse and includes Cisco Systems, Compaq, Hewlett-Packard, IBM, Microsoft, Novell, SGI, Sun Microsystems and Sybase, among others.

The HDCC is thus a source with potentially high credibility and reach for the years to come. For DBench it is particular interesting to partner with regarding the US segment of the industry user groups. CRITICAL attended the 2nd workshop, held in Santa Cruz, California, USA, and is now enrolled in the HDCC mailing list.

TPC

The Transaction Processing Performance Council is a recognized entity when addressing benchmarking. TPC benchmarks are among the best respected metrics in the database market. Due to its credibility it is a perfect source to peer with when addressing the industry user group, with focus on the database market players. TPC was itself in the past the stage for an initiative meant to measure reliability aspects in TPC benchmarks, which apparently never get off ground.

IFIP WG 10

Most of the DBench dissemination effort within IFIP will most likely occur in the SIGDeB forum. Nevertheless, IFIP Working Group 10.4 has already demonstrated interest in acting as a primary stage for DBench dissemination activities. A workshop devoted to Dependability Benchmarking has been held in Brazil with a strong participation of DBench partners and an official DBench presentation made my the project coordinator (for details please refer to section *7 Achievement* Status *and Short Term Plan*).

ESTEC

The European Space Research & Technology Centre holds an important role in the aerospace market. Working close with the aerospace industry, this ESA facility has been quite active setting software engineering best practices. It hosts and fosters the ECSS (European Cooperation for Space Standardization) initiative, which has been responsible for the ECCS series of user–friendly standards targeted to the European space agency.

The DBench outcomes in terms of embedded space applications will be particular interesting to ESTEC. Depending on the level of maturity reached by the benchmarking processes to be proposed by DBench one might expect to submit them to the ECSS standardizing activities.

SEI and ESEI

The SEI and its European counterpart – the ESEI – can play an interesting role as a secondary source of DBench dissemination content. Motivation for SEI and ESEI to adhere will depend on the extent that DBench outcomes will take the form of best practices or process suitable to be added to the current base maturity processes in the CMM/SPICE process models.

6 Media

Media and message are often mixed in marketing and dissemination. It is recognized as well that media can add or subtract value to the content, i.e., augment or diminishing the potential utilization

by the end user. The selection of the dissemination media must be carried out accordingly with end user profiles. Hopefully technological development has been enriching the availability of media types (and lessening the cost). However, it is noteworthy that several dissemination experts point out that personal interaction still remains the most effective medium [Paisley 1993]. DBench selection of media for its dissemination effort takes into account the above reasoning and will favour participation in workshops, conferences and fairs. The following sections list the preliminary set of medium types to be addressed.

6.1 Conferences

R&D conferences are perhaps the best media to target academia user groups. Content to be disseminated includes not only research papers but benchmark prototypes and multimedia presentation as well. There is an increasing trend to give more "space" to the latter type of content in traditional R&D conferences through tool demonstration and practical experience sessions or even booth exhibition areas dedicated to industry. A recent example was the DSN2001 conference (www.dsn.org), held in Göteborg, Sweden, where Critical Software has been present with a booth and used it to distribute the Dbench Executive Eummary (see section *7 Achievement Status and Short Term Plan* for details).

The consortia will submit contributions to recognised international conferences subject to the scientific peer review system. The preliminary list of target conferences includes DSN, RTSS, ICDCS, ISREE, HASE and EDCC.

6.2 Workshops

Two kinds of workshops will be attended/planned: research oriented and industry oriented. Research based workshops will be used not only for dissemination purposes but to obtain early feedback as well on the ideas developed in the project. Included events are the European Workshop on Dependable Computing (EWDC) and the IEEE series of workshops on validation of dependable systems. The purpose of these workshops is early dissemination of research results and the attendees are mainly dependability experts from Europe and the USA. Following the tradition in the dependable computing community, these are "true" workshops, and not mini-conferences. Presentations are short and informal, supported only by an extended abstract.

It is worth mentioning that a new DSN companion workshop has been launched exclusively dedicated to dependability benchmarking. This workshop is co-chaired by Philip Koopman and Henrique Madeira including several DBench partners in the Program Committee. It is anticipated that this will be a prime forum for DBench dissemination activities. Another already planned workshop will bring together the MAFTIA, DSoS and DBench projects in December, 2001. Other two EU 5th framework program projects were invited - FIT and MATISSE – but its participation is not yet firm. All the projects are related and the opportunity for cross-fertilization and cross-dissemination is very significant.

Workshops dedicated to industry user groups will typically be one-day events to be held at user premises. Following the principle of having the Advisory Board acting as an internal user group each workshop shall be closely planned with the target company/organization and be as tuned as possible on the target company/organization needs. While the research workshops will act as feedback

channels as well, industry workshops should focus on the delivery of mature content. In this way, it is anticipated that they will not occur before the project's 3rd year.

6.3 Journals

Comparing to conferences and workshops, journals are best known as vehicle of mature content. Mainly due to the long submission and editorial cycle time other, conferences and workshops tend to be preferred over journals for fast dissemination purposes. Conferences and workshops also enable interpersonal interaction but journals do not. However, journals offer a degree of recognition and maturity that should be fully exploited by DBench. Publications to be targeted include IEEE Transactions on Software Engineering and IEEE Transactions on Computers. For the industry user groups, notably consultants and end users, IEEE Computer, IEEE Software, IEEE IT Professional and IEEE Micro are relevant media as well.

6.4 Business Conference and Fairs

This class of events address typically the audience classified in DBench as Industry User Groups, notably the segments *I2 – Integrators* and *I3 – Consultants*. They combine presentations from industry practitioners (on best practices, new products and technical achievements) with large booth areas for vendors. From the DBench perspective they constitute a potential 2nd "ring" of audience for the benchmark methodology and prototypes. Two conferences were already elected for this purpose – one focused on the aerospace market, and the other on the enterprise computing market.

DASIA, DAta Systems in Aerospace, is an annual conference organized by the EUROSPACE (Association of European space industry) in coordination with the Canadian Space Agency (CSA), Centre National d'Etudes Spatiales (CNES), Eumetsat, Eurocontrol, and the European Space Agency (ESA). The focus of the conference is computer-based applications and technologies - hardware and software - for aerospace applications, in air/space and on ground. Another interesting event to attend in this area, exclusively dedicated to SMEs, is the Industry Space Days, organized annually by ESA.

The USENIX Technical Conference is held annually and is sponsored by USENIX (The Advanced Computing Systems Association). The target audience includes developers, researchers, system administrators and engineers with interests spanning the full range of technology. It is regarded as the premier forum for computing professionals to share the results of their latest and best work, develop new ideas and solutions, and connect with their colleagues. From the DBench perspective the opportunities for dissemination include papers, tutorials and booth based presentations.

6.5 Web

The web channel is a "must" on any dissemination activity, nowadays. Exploitation of web technology is planned within DBench for two main purposes:

- Build a permanent and online repository for DBench public content that will subsist after the project as well and will serve as "contact point" for further dissemination activities, i.e., a web site.

- Build and support a user community of dependability benchmarks.

While the first goal is already being implemented (refer to section 7), execution of the latter will depended on the maturity/acceptance of the prototype benchmarks that will be produced. To support this goal the web site will be designed to collect user information to enable mailing and newsletter based dissemination activities.

7 Achievement Status and Short Term Plan

The main outcome of the DBench *Dissemination and Implementation* activity so far is this document itself. Despite of being just the result of the first planning iteration, it already brings a solid foundation for dissemination and use activities. The key four vectors for dissemination activities – users, content, message and media – have been analyzed from the DBench perspective and dissemination scenarios were proposed. Concurrently with planning activities, a significant dissemination work on the field has already been achieved as well. The following subsection addresses implementation progress made so far, mostly in terms of content produced and events attended.

7.1 Achievement Status

DBench logo

A study for the design of the DBench visual identity is underway. The study includes development of a visual identity manual, for internal use, including definition of visual identity elements, reduction scales, color and type schemes. The logo is already defined – please refer to *Annex 1 – DBench logo* for details – and its application to the web, brochures, stationary, and other support materials is underway.

Executive summary

A first version of the Dbench *Executive Summary*, one of the contents listed in *Table 1 – Content types and user groups* aimed at management audience, has been produced and released in the DSN2001 conference. Please refer to *Annex 2 – DBench Executive Summary* for the complete content.

Press release

A press release signaling DBench kick-off has been issued and is available online at Critical Software web site (http://www.criticalsoftware.com/company/pressRel/jan06_01.htm). The full content is also available at *Annex 3 – DBench kick-off press release*. A Portuguese version of the press release was also edited and its impact in popular and technical media was quite good.

Web site

A domain name is already registered – dbench.org – and the design of the web site is underway. Currently, the URL www.dbench.org is being redirected to the projects "private" web site hosted at LAAS facilities.

ISD2001

Critical Software participated in this year ISD conference (Industry Space Days). The conference is aimed at bringing together SME's that are entering the space sector, large aerospace companies, and ESA. It consists of workshops, panel discussions, and bilateral meetings.

The ISD was held in 9,10 May 2001 in Noordwijk, The Netherlands, in the ESTEC (European Space Technology Center). During the ISD, Critical representatives have discussed namely with people from the TOS-QQ (Quality Assurance) of ESA the needs and requirements of the Agency in terms of software reliability, dependability evaluation, and software certification.

IFIP 10.4 Workshop

The 39th IFIP WG 10.4 meeting, held in 28, February to 3, March 2001 in Brazil, hosted a workshop on "Dependability Benchmarking" jointly organized with the SIGDeB. A considerable amount of DBench partners attended the meeting and made powerful contributions to the dissemination effort of DBench. Workshop program and presentation slides are available at the SIGDeB web site (http://www.cs.cmu.edu/~koopman/ifip_wg_10_4_sigdeb/external/01_02_28/).

2nd HDCC workshop

Critical Software attended the 2nd HDCC (High Dependability Computing Consortium) workshop held in 9,10 May, Santa Clara, CA, USA. Besides hosting a company booth, Critical participated in the Industry track meeting together with several potential DBench industry users. Critical is now in the mailing list of HDCC which can facilitate future dissemination activities aimed at this community.

DSN2001

Being the most prestigious event worldwide in the dependability research area, this year edition of the Dependable Systems and Networks conference, held in Sweden, was a significant momentum for DBench. All the consortium partners were present, with a significant set of papers being presented by each partner in research topics that gravitate around the DBench framework.

Critical Software was present with a booth in the area dedicated to sponsors and industry vendors and besides its own merchandising and products it also released the DBench Executive Summary. A DBench project presentation was delivered as well, in the aim of the DEPPY (The European Dependability Initiative) Workshop, which gathered a considerable audience.

7.2 Short Term Plan

The DBench focus on OTS technology is a great benefit for the dissemination effort. Providing project outcomes in the form of tools that can be executed on a desktop PC running Windows or Linux OSs contributes to break acceptance barriers at user premises. Care must taken however because the OTS envelope must not be seen as a panacea to guarantee successful dissemination. It should be stressed that we are focusing on dissemination and use of edge research work. So, a substantial effort must be done to translate concepts and words to the particular user domain. Furthermore, in addition to knowledge and technology it is needed to disseminate the idea of dependability benchmarking.

Dissemination and Implementation activities for the second half of 2001 will concentrate on refining and extending the planning and dissemination activities as well, according with the following guidelines:

- Detail the user profiles and edit the *"framework" brochures* (preliminary versions) associated with each application domain (Table 1 for details).

- Establish the dissemination evaluation metrics, i.e., *how will we know our dissemination activities have been successful? Which data is to be collected?*

- Identification of potential barriers that may interfere with dissemination or utilization of information and planned actions to reduce these barriers.

- Pursue www.dbench.org web design and implementation.

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Annex 1 – DBench logo

Annex 2 – DBench Executive Summary

RTD PROJECT: IST-2000-25425, Action Line IST-2000-5.1.4

PARTNERS: LAAS/CNRS, Chalmers University, University of Coimbra, Friedrich Alexander University, Polytechnical University of Valencia, CRITICAL Software S.A., Microsoft (sponsor).

INDUSTRIAL ADVISORY BOARD: Astrium, CMU, INDRA, Oracle, Saab Ericsson Space, Thales.

COORDINATOR CONTACT: Karama Kanoun (kanoun@laas.fr), LAAS-CNRS, France

EXECUTIVE SUMMARY

An increasing range of industries, users and society at large have a growing dependence upon software-based control systems, communication systems, applications and services. The key characteristics of these systems are their complexity, large-scale distribution, inclusion of legacy and Off The Shelf (OTS) components, mobility and flexibility. The systems cover safety-, mission-, and security- as well as business-critical systems and a broad range of emerging applications areas such as embedded systems in consumer goods, health support, personal communications, electronic commerce and transport. The novelty of the applications, the extensively deployed nature of new technologies and their common characteristics give rise to new types of problems and challenges to dependability.

Up to date, there is no general methodology for justifying the reliance on the services these systems deliver. The aim of **DBench** is to contribute to the definition of this general methodology.

DBench will provide to system developers and end-users means for i) assessing the dependability of a system, ii) identifying malfunctioning or weak components of a system which require special attention, iii) tuning a particular component to enhance its dependability, and iv) comparing the dependability of alternative or competing solutions. Therefore, it will help to develop highly dependable systems in an efficient way, thus increasing the competitiveness of system providers.

The **DBench** project addresses two application areas based on two families of OTS operating systems: embedded systems, and transactional systems with database and web servers, all integrated in network-based infrastructures.

DBench will develop concepts, guidelines and prototypes for dependability benchmarking. It is very important that the same concepts and guidelines be generalised and used in all countries of the EC and abroad, in order to make all systems comparable from the dependability point of view.

Going further, as the purpose of the project is the globalisation of dependability benchmarking, the main guidelines for this purpose can contribute to formulate and implement standards, European or global. **DBench** will provide useful inputs for the standardisation bodies to define guidelines for the certification of critical systems incorporating OTS components. In this case, the challenge is to reach a global consensus for dependability benchmarking standardisation.

Finally, recent developments in computers and communications enable operation of large systems formed by a very large number of components. The provision of effective conceptual and experimental frameworks for benchmarking system and component dependability to select the most suitable subsystems from the dependability point of view is likely to reduce the significant manpower needed to develop OTS-based systems. It is thus a potential to an achievement to contribute to increase the productivity in these booming service sectors where qualified manpower is scarce.

Annex 3 – DBench kick-off press release

PRESS RELEASE

Critical Software participates in European R&D consortium
High-tech spin-off is responsible for the technology transfer

SAN JOSE, Calif., & COIMBRA, Portugal, - January 6, 2000 - Critical Software participates in a European R&D project integrated in the European Union's IST (Information Society Technologies) program. The objective of the DBENCH (Dependability Benchmarking) project is to define and validate dependability benchmarks for largely deployed computer systems.

"*Critical Software's participation in the DBENCH project is due to the company's know-how and experience in dependable systems*" – João Carreira, CEO.

DBENCH will provide system builders/integrators and final customers with the necessary tools to evaluate precisely the robustness of IT systems, identify components with defective behaviour, configure solutions to provide a specific level of availability or integration and ultimately benchmark complete solutions as to their dependability.

As to R&D, Critical Software will be responsible for supplying adapted versions of Xception, the automated fault-injection technology. This technology will be integrated in the project for evaluation of availability, integrity and dependability of IT systems. Critical Software's paper within the consortium is to lead the technology transfer process and commercial exploration of the project's results. Relating to the *exploitation plan* associated with DBENCH after project completion, the company will also be responsible for the development and maintenance of the web site where the benchmark prototypes will be available.

The project consortium includes institutions like the Centre Nationale de la Recherche Scientifique (France), the University of Chalmers (Sweden), the Fiedrich Alexander University (Germany), the Technical University of Valencia (Spain) and the University of Coimbra (Portugal). The IAB (Industrial Advisory Board) includes companies such as Oracle, Astrium, Saab Ericsson Space, Caldera and Thomson CSF, while Microsoft appears as the project's sponsor.

IST - http://europa.eu.int/comm/information_society/ist/index_en.htm

Contact: mkt@criticalsoftware.om