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INTERNATIONAL NUCLEAR SAFETY CENTER (INSC) DATABASE

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ABSTRACT

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As an integral part of DOE's International Nuclear Safety Center (INSC) at Argonne National Laboratory, the INSC Database has been established to provide an interactively accessible information resource for the world's nuclear facilities and to promote free and open exchange of nuclear safety information among nations. The INSC Database is a comprehensive resource database aimed at a scope and level of detail suitable for safety analysis and risk evaluation for the world's nuclear power plants and facilities. It also provides an electronic forum for international collaborative safety research for the Department of Energy and its international partners. The database is intended to provide plant design information, material properties, computational tools, and results of safety analysis. Initial emphasis in data gathering is given to Soviet-designed reactors in Russia, the former Soviet Union, and Eastern Europe. The implementation is performed under the Oracle database management system, and the World Wide Web is used to serve as the access path for remote users. An interface between the Oracle database and the Web server is established through a custom designed Web-Oracle gateway which is used mainly to perform queries on the stored data in the database tables.

Information currently being gathered from available sources and incorporated into the database is organized under various categories such as: (a) plant-specific design data, (b) collection of safety related documents and results from generic and plant-specific safety analyses and risk evaluations, (c) materials and properties, (d) documentation of computer codes and analyses input data, and (e) links to other information sources and databases. The database provides an electronic forum for international collaboration by the use of project development boards. These project boards are provided to facilitate a structured interorganizational communication among the contributors based on e-mail protocals and serve as an on-line archive of project development.

The database contains general and detailed design information for about 600 power reactors that are operable, under construction, ordered, shutdown, or decommissioned with electricity generating capacity of 35 MW or more. The database also contains information for 590 research reactors in 74 countries, 560 fuel processing facilities in 44 countries, and links to other information resources and databases such as those supported by the US-NRC and the IAEA.. The public segments of the database are available for unrestricted public use as a INSC-maintained information resource for the U.S. DOE. Alternately, non-public segments of the database are reserved for work in progress and/or proprietary information shared by INSC and its international safety research partners.

Material properties that are included in the database are intended to meet the needs of analysts using computer codes and doing experiments for safety evaluation of the world's commercial nuclear reactors. The focus is on the materials used in light water reactors (LWRs) with initial emphasis on high priority properties of materials unique to Soviet nuclear reactor designs and reactors in Russia, the former Soviet Union, and Eastern Europe. The longer-term

goal is to include data that will meet future needs such as materials used in evolutionary reactor designs, properties of extended burnup fuel, and properties of oxide and mixed oxide fuels over a wide range of operating and accident conditions.

The international collaboration potential of the database has been demonstrated with the establishment of a sister site in Russia. The Russian International Nuclear Safety Center (RINSC) Database, implemented by Research and Development Institute of Power Engineering (RDIPE), provides plant specific up to date information for Russian reactors and material properties. The RINSC database site serves as a prototype for implementation of additional database sites internationally.

The lines of communication and the direction of information flow within the INSC database system is shown in Figure 1. In a typical application, requests received through the Web server are passed to the Web-Oracle interface through Web server's Common Gateway Interface (CGI). These requests are processed by the Web-Oracle interface programs and converted to Structured Query Language (SQL) statements. Responses received to those queries from the Oracle database system are then postprocessed and passed back to the server in the form of hypermedia information pages. This way, the static introductory Web pages are complimented with dynamically created Web pages where the Web-Oracle interface prepares the page on demand according to a search criteria and the data stored in the Oracle database system. The INSC Database can be accessed on the World Wide Web through http://www.insc.anl.gov.

DISCLAIMER

Remote
Web Client

TCP/IP   Firewall

HTTP

| Dynamic HTML Pages prepared on the fly | World Wide Web Server (HTTP Deamon) | Static HTML Information Pages |

POST/GET

Web-Oracle Interface
(Receive query parameters,
convert requests to SQL queries,
exchange data with Oracle,
postprocess responses, and return)

SQL queries

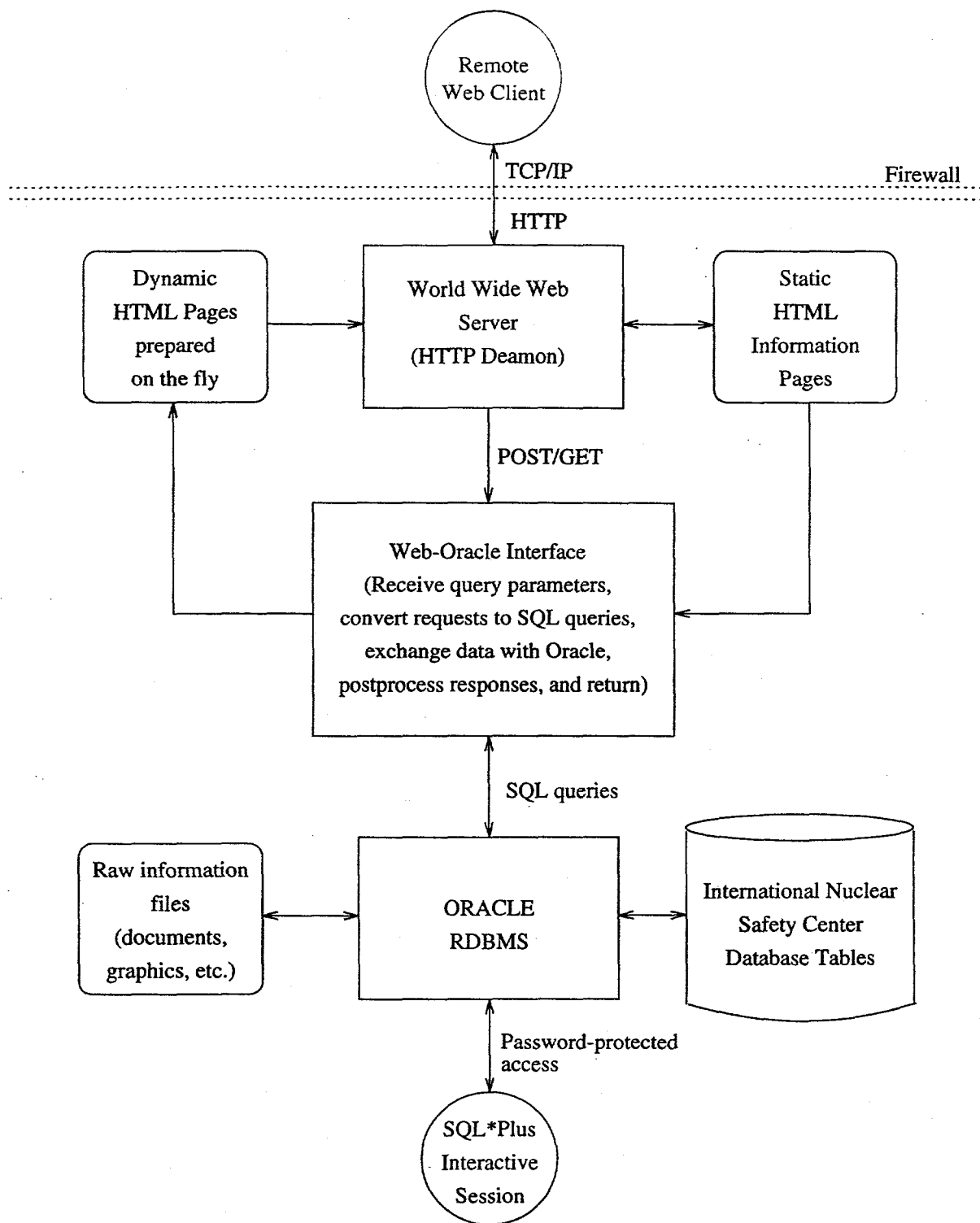| Raw information files (documents, graphics, etc.) | ORACLE RDBMS | International Nuclear Safety Center Database Tables |

Password-protected
access

SQL*Plus
Interactive
Session

Fig. 1. Schematic Diagram of the International Nuclear Safety Center Database System.

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