# TPC BENCHMARK™ C

**Standard Specification**
Revision 5.1

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## TPC Membership

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**Document History**

| Date | Version | Description |
|---|---|---|
| 22 June 1992 | Draft 6.6 | Mail ballot version (proposed standard) |
| 13 August 1992 | Revision 1.0 | Standard specification released to the public |
| 1 June 1993 | Revision 1.1 | First minor revision |
| 20 October 1993 | Revision 2.0 | First major revision |
| 15 February 1995 | Revision 3.0 | Second major revision |
| 4 June 1996 | Revision 3.1 | Minor changes to rev 3.1. |
| 27 August 1996 | Revision 3.2 | Changed mix back to 3.0 values. |
| 12 September 1996 | Revision 3.2.1 | Fixed Member list and added index |
| 15 January 1997 | Revision 3.2.2 | Added wording for TAB Ids #197, 221 & 224 |
| 6 February 1997 | Revision 3.2.3 | Added wording for TAB Ids #205, 222 & 226 |
| 8 April 1997 | Revision 3.3 | New Clauses 2.3.6 & 9.2.2.3 (TAB Id #225) |
| 9 April 1997 | Revision 3.3.1 | Wording added for availability date in Clause 8.1.8.3 |
| 25 June 1997 | Revision 3.3.2 | Editorial changes in Clauses 8.1.6.7 and 9.1.4 |
| 16 April 1998 | Revision 3.3.3 | Editorial changes in Clauses 2.5.2.2 and 4.2.2 |
| 24 August 1998 | Revision 3.4 | New Clause 5.7 and changed wording in Clause 8.3 |
| 25 August 1999 | Revision 3.5 | Modify wording in Clause 7.1.3 |
| 18 October 2000 | Revision 5.0 | Change pricing, 2 Hour Measurement, 60 Day Space |
| 6 December 2000 | Revision 5.0 | 7x24 Maintenance, Mail Ballot Draft |
| 26 February 2001 | Revision 5.0 | Official Version 5.0 Specification |
| 11 December 2002 | Revision 5.1 | Clause 3.5.4, PDO Limitations, Cluster Durability, Checkpoint Interval, Typographical Errors |

# TABLE OF CONTENTS

# Clause 0: PREAMBLE

## 0.1 Introduction

TPC Benchmark™ C (TPC-C) is an OLTP workload. It is a mixture of read-only and update intensive transactions that simulate the activities found in complex OLTP application environments. It does so by exercising a breadth of system components associated with such environments, which are characterized by:

- The simultaneous execution of multiple transaction types that span a breadth of complexity
- On-line and deferred transaction execution modes
- Multiple on-line terminal sessions
- Moderate system and application execution time
- Significant disk input/output
- Transaction integrity (ACID properties)
- Non-uniform distribution of data access through primary and secondary keys
- Databases consisting of many tables with a wide variety of sizes, attributes, and relationships
- Contention on data access and update

The performance metric reported by TPC-C is a "business throughput" measuring the number of orders processed per minute. Multiple transactions are used to simulate the business activity of processing an order, and each transaction is subject to a response time constraint. The performance metric for this benchmark is expressed in transactions-per-minute-C (tpmC). To be compliant with the TPC-C standard, all references to TPC-C results must include the tpmC rate, the associated price-per-tpmC, and the availability date of the priced configuration.

Although these specifications express implementation in terms of a relational data model with conventional locking scheme, the database may be implemented using any commercially available database management system (DBMS), database server, file system, or other data repository that provides a functionally equivalent implementation. The terms "table", "row", and "column" are used in this document only as examples of logical data structures.

TPC-C uses terminology and metrics that are similar to other benchmarks, originated by the TPC or others. Such similarity in terminology does not in any way imply that TPC-C results are comparable to other benchmarks. The only benchmark results comparable to TPC-C are other TPC-C results conformant with the same revision.

Despite the fact that this benchmark offers a rich environment that emulates many OLTP applications, this benchmark does not reflect the entire range of OLTP requirements. In addition, the extent to which a customer can achieve the results reported by a vendor is highly dependent on how closely TPC-C approximates the customer application. The relative performance of systems derived from this benchmark does not necessarily hold for other workloads or environments. Extrapolations to any other environment are not recommended.

Benchmark results are highly dependent upon workload, specific application requirements, and systems design and implementation. Relative system performance will vary as a result of these and other factors. Therefore, TPC-C should not be used as a substitute for a specific customer application benchmarking when critical capacity planning and/or product evaluation decisions are contemplated.



Benchmark sponsors are permitted several possible system designs, insofar as they adhere to the model described and pictorially illustrated in Clause 6. A Full Disclosure Report of the implementation details, as specified in Clause 8, must be made available along with the reported results.

**Comment:** While separated from the main text for readability, comments are a part of the standard and must be enforced. However, the sample programs, included as Appendix A, the summary statements, included as Appendix B, and the numerical quantities summary, included as Appendix C, are provided only as examples and are specifically not part of this standard.

## 0.2 General Implementation Guidelines

The purpose of TPC benchmarks is to provide relevant, objective performance data to industry users. To achieve that purpose, TPC benchmark specifications require that benchmark tests be implemented with systems, products, technologies and pricing that:

- Are generally available to users.
- Are relevant to the market segment that the individual TPC benchmark models or represents (e.g. TPC-A models and represents high-volume, simple OLTP environments).
- A significant number of users in the market segment the benchmark models or represents would plausibly implement.

The use of new systems, products, technologies (hardware or software) and pricing is encouraged so long as they meet the requirements above. Specifically prohibited are benchmark systems, products, technologies, pricing (hereafter referred to as "implementations") whose primary purpose is performance optimization of TPC benchmark results without any corresponding applicability to real-world applications and environments. In other words, all "benchmark specials," implementations that improve benchmark results but not real-world performance or pricing, are prohibited.

The following characteristics should be used as a guide to judge whether a particular implementation is a benchmark special. It is not required that each point below be met, but that the cumulative weight of the evidence be considered to identify an unacceptable implementation. Absolute certainty or certainty beyond a reasonable doubt is not required to make a judgment on this complex issue. The question that must be answered is this: based on the available evidence, does the clear preponderance (the greater share or weight) of evidence indicate that this implementation is a benchmark special?

The following characteristics should be used to judge whether a particular implementation is a benchmark special:

- Is the implementation generally available, documented, and supported?
- Does the implementation have significant restrictions on its use or applicability that limits its use beyond TPC benchmarks?
- Is the implementation or part of the implementation poorly integrated into the larger product?
- Does the implementation take special advantage of the limited nature of TPC benchmarks (e.g., transaction profile, transaction mix, transaction concurrency and/or contention, transaction isolation) in a manner that would not be generally applicable to the environment the benchmark represents?
- Is the use of the implementation discouraged by the vendor? (This includes failing to promote the implementation in a manner similar to other products and technologies.)
- Does the implementation require uncommon sophistication on the part of the end-user, programmer, or system administrator?