

The Measured Performance of Personal Computer Operating Systems

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Reading order (1-4 → “Executive Summary”)

1. Title
2. Abstract
3. Introduction
4. Conclusions
5. Rest of the paper

Expectations

1. Title
 - a. Measured performance → more objective than “opinion” (→ factors?)
 - b. performance measure / PCs → Windows (one or more versions) + Unix/Linux (it would not be unreasonable to expect a comparison with another O/S than Windows)
 - c. O/S → system space + user space (applications) (in some arrangement)
 - d. O/S → O/S system commands + memory (memory caching?) + file system (buffering techniques?) + network (throughput / end-to-end aspects) ?
 - e. Microkernels?
 - f. Specific hardware (h/w) facilities ??? → platform dependent
 - g. Which performance measures will be used?
 - h. Hardware related → comparison performed in the same environment
2. Abstract
 - a. 2 Windows O/S (Windows for Workgroups + Windows NT) and 1 Unix (NetBSD)
 - b. Pentium processor → h/w counters inbuilt → microbenchmarks
 - c. Applications → end-to-end performance
 - d. Microkernel measurements (as expected from the title)
 - e. Graphics system testing
 - f. File system buffer caching
3. Introduction
 - a. Unix versus Windows (System A/B) → 3 system comparison
 - i. Windows system A compared with system B
 - ii. Unix compared with Windows system A
 - iii. Unix compared with Windows system B

- b. Note that so far we have just read the title + the first column of the paper (this took around 10 minutes)*
- c. Windows – disadvantages (-ve)
 - i. Intel 8086 compatibility → newer Windows systems with modern features are a fix (user-level services)
- d. Hardware is specified in Table 1
- e. Strategy for analysis
 - i. Microbenchmark statistics
 - ii. Explain these measurements i.e. the implications
 - iii. Application statistics
 - iv. Explain application performance in terms of microbenchmark results (i.e. tie the measurements into a cohesive whole)
- f. Restrictions (compromises)
- g. Implications of Intel 8086 compatibility
 - i. factor 7 overhead
 - ii. microkernel implies extra costs
 - iii. Windows NT advantage over NetBSD

4. Conclusions

- a. Structure of PC O/S impacts costs
 - i. System functionality
 - ii. Backward compatibility → overhead cost (factor 7)
 - iii. Costs in Windows come from the system structure and not the API
- b. Windows NT has some advantages but also high cost overheads
 - i. Result of the microkernel structure (-ve)
 - ii. Good graphics performance (+ve)
- c. There were limitations to this study (no surprise – we expect this!)
- d. NetBSD - +ve & -ve

The whole exercise – read the title, abstract, introduction and conclusion took about 15 minutes – if you have practised (and are aware).

In “reading” and “writing”, there are two basic requirements worth reflecting over

1. **practice** – you have to train and learn by doing
2. **awareness** – practice without awareness is not productive and you have also to cultivate a degree (several degrees) of awareness and learn to read and write consciously.

Exercise: Reflect upon what has been said here and start applying these ideas to your reading and writing in the future.