CRAY-1 The First Supercomputer

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October 24, 2011



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Steps behined you....what ??





The CRAY-1 with its inventor Seymour Cray



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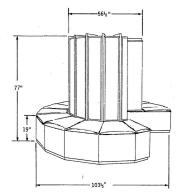
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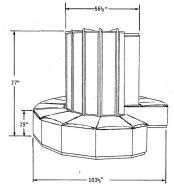


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- Had spawned a new class of computer called "The Supercomputer".

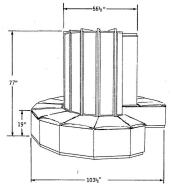


Physical Dimensions of CRAY-1



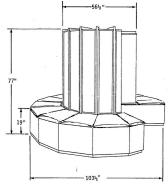
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- Arranged in a 270 degree arc with base of 103.5".



CRAY-1 is equiped with-

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- Opens the door towards modern Supercomputers.

References

- R.M.Russell -"The CRAY-1 Computer System", Communication of ACM, vol 21,1978
- Cray Research Inc.-" CRAY-1 Hardware Reference Manual", Nov 4, 1977
- http://www.thocp.net/
- http://en.wikipedia.org/
- http://research.microsoft.com/