COMPETITIVE ANALYSIS

UNIVAC 1108 VS. IBM SYSTEM 360-62/-70

You have just been presented the newest and largest member of the UNIVAC family of computer systems. You now know what it is and something about what it can do. Now, where does it fit? What does it compete against? Is it competitive?

First. The 1108 is a large computing system. It is admirably suited for either scientific problems, high-volume conventional data processing, or a combination of both. AND, in its field, the 1108 is a high-performance extremely competitive system, flexible, and attractively priced.

Second. In raw speed, the 1108 falls somewhere between the IBM models 360-62 and the 360-70, closer to the -70 than the -62. The 1108 is priced below both and in systems thruput is second to none. And that is a selling combination.

For the purposes of this analysis, we shall compare the UNIVAC 1108 with the IBM 360-62 and 360-70 since, in all probability, this will be our major competition.

A. Central Computer

1. Logic

Central Computer logic is basically similar for all large-scale computing systems. The Model 360's are hexadecimal machines but at the 360-62/70 level they act as modified 32/64-bit word machines with a main memory and a local store. The 1108 is a 36/72-bit word machine with a main memory and a control memory. Thus, the logical organization is very close. IBM talks about a universal instruction set and this may be important to the small 360 Series user but it means nothing to the upper end user. He is not interested in downward compatibility. It would be valuable for peripheral service routines (card-to-tape, tape-to-printer, etc.), but 360-62/70 users have few peripherals in common with the 360-30 tape user.

2. Local Store and Control Memory

The 360-62/70 Models use a control memory of sorts called "local store." The 1108 uses a control memory and both memories (control or local) are really integrated circuit registers.

FEATURE	UNIVAC 1108	IBM 360-62	IBM 360-70
SIZE	128 36-bit words	16 32-bit registers plus 4 64-bit floating point registers	16 32-bit registers plus 4 64-bit floating point registers
SPEED (CYCLE TIME)	125 nanoseconds	250 nanoseconds	200 nanoseconds

IBM Advantages: All 16 general registers can be used as arithmetic registers or as index registers (the 1108 has only four common registers).

Each register can be used as an operand to reduce operation times.

UNIVAC Advantages: 128 registers instead of 16

Faster cycle time

Increased flexibility

SUMMARY: Control Memory is an excellent idea as our 1107 users all know. Let's welcome IBM aboard.

3. Instructions

Once again we have a rough equivalence in abilities. Our word size is larger, but the instructions are about the same. Our double precision floating point format is superior and they do not have partial word arithmetic. However, they can use local store for operands and their double precision times are the same as the single precision times.

Several years ago the National Aeronautics and Space Administration introduced a mix of instructions called the "Gibson Mix," the idea being that this mix could serve as a reasonable basis for comparing the internal processing speeds of the various computers. We shall not go into any details on the constitution of the Gibson Mix, but the results imply that the 1108 is roughly 4% faster than the IBM 360-70 and almost twice as fast as the 360-62.

B. Main Memory

The IBM 360 Series memories are organized in 8-bit bytes and the Models -62 and -70 drive 8 bytes at a time for a 64-bit data width. The UNIVAC 1108 main memory is organized into 36-bit words in two to four independent banks. Because of these differences in organization, an exact equivalence cannot be obtained, but the following correlation is relevant:

UNIVAC 1108		IBM 360
65K = 2,359,296 bits	$\simeq$	256K = 2,097,152 bits
131K = 4,718,392 bits	$\simeq$	512K = 4,194,304 bits

In either instance, UNIVAC 1108 memory is slightly larger.

	UNIVAC 1108	IBM 360-62	IBM 360-70
Cycle Time	.75* μsec.	1.0 μsec.	1.0 μsec.**
Minimum Size	32K	256K	256K
Maximum Size	131K	512K	512K

* Dual bank operation for an effective .375 μsec. cycle time.

** Interleaved Memory to give faster access by about 25%

IBM Advantages: 64 bits at a time, direct addressing to all 512K

UNIVAC Advantages: Larger and faster

Thus, the main memories are very similar with UNIVAC having a slight, but definite advantage over the 360-70 and a considerable advantage over the 360-62.

C. Input/Output

The IBM 360 series offers two types of I/O channels, selector channels and multiplexor channels. Selector channels are primarily designed for magnetic tapes and disk files while multiplexor channels are for card equipment, printers, communications devices, etc. The interesting thing about this is that the Models 360-62 and 360-70 can only be equipped with selector channels. This means that neither system can be used as a communications terminal or have "on-line" peripherals. Therefore, the 360-62 and 360-70 will have to be quoted with a 360-30 alongside.

Item: The UNIVAC 1108 is equipped with 8, 12, or 16 general purpose I/O channels. Each and every channel has ESI and is thus a potential communications terminal.

Item: The use of "on-line" peripherals (card readers, printers, etc.) saves the cost of a satellite computer.

Peripheral Devices

Both UNIVAC and IBM offer a large and varied assortment of peripheral devices. To simplify matters, we shall consider only those peripheral devices normally found with systems of this size.

1. **Magnetic Tape Units** – The UNIVAC, IBM compatible tape series (Uniservo IVC, VIC, VIIIC) are equivalent to the IBM Model 2400 Tape series. UNIVAC does not have an equivalent to Hypertape. However, in instances where high transfer rates are required, our systems design allows us to substitute drum storage instead of tape units to obtain even higher transfer rates.

2. **Magnetic Drum Storage** – IBM offers the Model 2301 drum with the 360 series. The 1108 has the FH-880 B.

	UNIVAC FH-880 B	IBM 2301
Capacity/Unit	9,437,084 characters	4,000,000 characters
Average Access Time	8.5 milliseconds	8.6 milliseconds
Transfer Rate	1.44 mc.	1.20 mc.
Accessibility	Dual channel R/R, R/W, W/W	Single channel R/W

3. **Mass Storage Device** – UNIVAC FASTRAND II and IBM Model 2321 Data Cell compare as follows:

	FASTRAND II	IBM 2321 Data Cell
Capacity/Unit	132 million characters	400 million characters
Average Access Time	92 milliseconds	480 milliseconds
Transfer Rate	150.9 KCS	55 KBS
Accessibility	Dual channel R/R, R/W	Single channel R/W

IBM is larger – we are faster

4. **Bulk Storage** – UNIVAC does not have anything equivalent to the IBM eight microsecond bulk core storage at this time.

5. **Communications** – Here UNIVAC is far ahead . . . with experience instead of experimentation. Every channel of the 1108 is a potential communications terminal and we can demonstrate remote 1004's via DLT's now. IBM cannot have communications directly on either the 360-62 or -70.

   Another point is software. All the glamour electronics of the age cannot work with a computer system unless the software is there also. We have the software and it's available now.

D. Systems/Support

Support

This is a difficult area to compare because we have it and IBM does not. Remember, the SOFTWARE that they promise WE CAN DELIVER NOW.

Systems

In the systems area the UNIVAC 1108 has the following advantages:

1. **On-Line Philosophy** – The 1108 on-line I/O is consistently and considerably more convenient and less expensive than the satellite 360-30 system required by the 360-62 or 360-70.

2. **Overall Thruput** – The systems organization of the 1108 gives a much faster turnaround than the equivalent 360 configuration.

3. **Scheduling** – Scheduling is considerably easier on the 1108 because the peripherals are in the immediate vicinity and not in a remote location with the satellite computer.

4. **Magnetic Tape Usage** – Because the 1108 software is drum-oriented an extensive reduction in magnetic tape costs is possible. Some areas of cost reduction are:

   a. Fewer tape units required to do the same job (e.g. the FORTRAN IV and COBOL compilers do not require magnetic tapes.)

   b. Reduction in magnetic tape inventory

   c. Reduction in library effort

   d. Reduction in the amount of magnetic tape "used up." This can be as high as one or two reels a day at large installations.

5. **Floor Space Requirements** – Once again, the systems organization (fewer tapes, on-line peripherals) reduces floor space requirements by up to 33%.

SUMMARY

The 1108 is a high-performance system that can be favorably compared with any system delivered or announced. It is very flexible, attractively priced, and available sooner than its competition. The software is available now and can be demonstrated to be superior.

This system can be sold.