"The Availability Corner"
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About the Authors:

Dr. Bill Highleyman, Paul J. Holenstein, and Dr. Bruce Holenstein, have a combined experience of over 90 years in the implementation of fault-tolerant, highly available computing systems. This experience ranges from the early days of custom redundant systems to today's fault-tolerant offerings from HP (NonStop) and Stratus.

Series Topics:

Testing Your System Recovery Plan (09/06)
Is IBM's Parallel Sysplex a NonStop Competitor? (06/06)
Grid Computing (03/06)
The Net Present Value of Active/Active Systems (01/06)
TCO for Active/Active Systems (11/05)
Fault Tolerance vs. High Availability (09/05)
The Great Tape Backup Paradigm Shift (07/05)
The Language of Availability (05/05)
What Reliability Do We Really Need? (01/05)
Let's Measure System Reliability in Centuries (11/04)

***Gravic, Inc*.**
Shadowbase Products Group
17 General Warren Blvd.
Malvern, PA 19355
610-647-6250
www.ShadowbaseSoftware.com

The Availability Corner

The Net Present Value of Active/Active Systems

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Dr. Bill Highleyman
Dr. Bruce Holenstein
Paul J. Holenstein

In our last column, we discussed the factors that should be considered in configuring an active/active system to achieve the desired availability for the least cost. But in many cases, the least cost approach is not always so obvious because the cost of money has to be factored in.

Spending $10,000 next year is better than spending $10,000 this year because we do not have to pay interest for a year. At 10% interest, we could spend $9,090 this year to cover a $10,000 expense next year. Likewise, getting a return of $10,000 next year has less value than getting $10,000 this year for the same reason. If we got $10,000 next year, that is as good as getting $9,090 this year at 10% interest. Thus, expenditures or returns in the future always translate into smaller values in the present.

The amount of investment (a return is simply a negative investment) that we make in the future is called the *future value*, or *FV*, of that investment. Its value today is called the *present value*, or *PV*. Assume that an investment of PV dollars is made today for N periods (a period is typically a month or a year) at a compounded interest rate of i percent per period. PV is defined as the *present value* of the investment at the time that it was made. After the first period, the investment will be worth $PV(1+i)$ dollars. After the second period, it will be worth $PV(1+i)^2$ dollars, and so on. After N periods, its value is $PV(1+i)^N$ dollars. This is called the *future value* FV of the investment. Therefore, the present value, PV, is related to the future value, FV, by $PV = FV/(1+i)^N$. Note that the present value is always less than the future value.

The bottom line is that any expenditure or return in the future has more value than that same expenditure or return today. So if we are looking to install a multi-node active/active system today that will have loan payments; lease payments; software licenses; maintenance fees; downtime costs; and costs for people, facilities, and networks spread over a period of years with a trade-in value at the end, what exactly is the anticipated cost for that? It is not simply the sum of all of the costs because many of these are incurred some years in the future. It is the sum of the present values of each expenditure and return. This is called the *net present value*, or NPV, of the investment.

If two or more approaches are to be compared (for instance, a five-node UNIX system versus a four-node NonStop system), then the NPV can be calculated for each approach; and the approach with the least NPV wins the cost contest.

The result is not always obvious. Sometimes, the approach that appears to cost the most can in fact be cheaper when NPV is considered. For instance, consider the following choice:

- Option A: A one-time license charge (OLC) of $100,000 is due at the beginning of the first year. This covers the first eight years of licensing and maintenance. In the ninth and tenth years, an annual service charge (ASC) of $28,000 per year, due at the beginning of the year, is charged.

- Option B: An OLC of $40,000 is due at the beginning of the first year. Thereafter, for four years, an annual licensing and service charge (ALSC) of $28,000 per year is due at the beginning of each year. Licensing and service are then paid up for the remaining five years.

Option A has a total cost of $156,000, and Option B has a total cost of $152,000. At first blush, Option B looks less expensive. But the NPV tells a different story depending upon the interest rate. At 8%, Option A has an NPV of $129,134; and Option B has an NPV of $132,740. Therefore, Option A is less expensive over the long run.

There are other tools that can help as well. A technique called *Internal Rate of Return* can be used to determine the interest rate at which two approaches have equal NPVs by calculating the effective interest rate of the difference between the NPVs of the two approaches.[1]

[1] See Volume 2 of "*Breaking the Availability Barrier: Achieving Century Uptimes with Active/Active Systems*."