

# Product Introduction

Summary

## Hybrid Server & Hybrid Storage

SSD 기반 Server & Storage

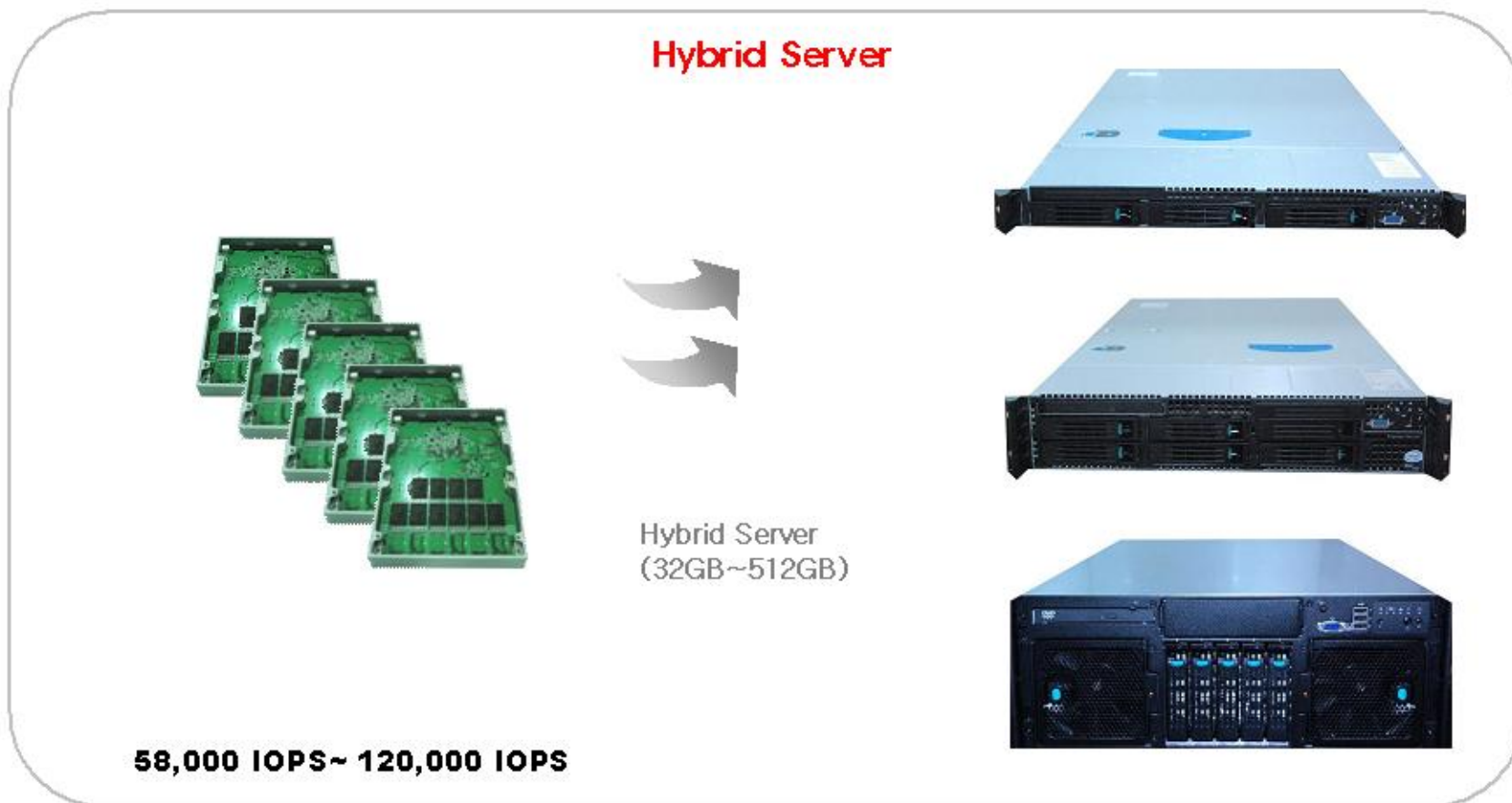
2007.07

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# 1. Hybrid Server (상표출원번호: 4020070032052)

## ◆ Concept of Hybrid Server

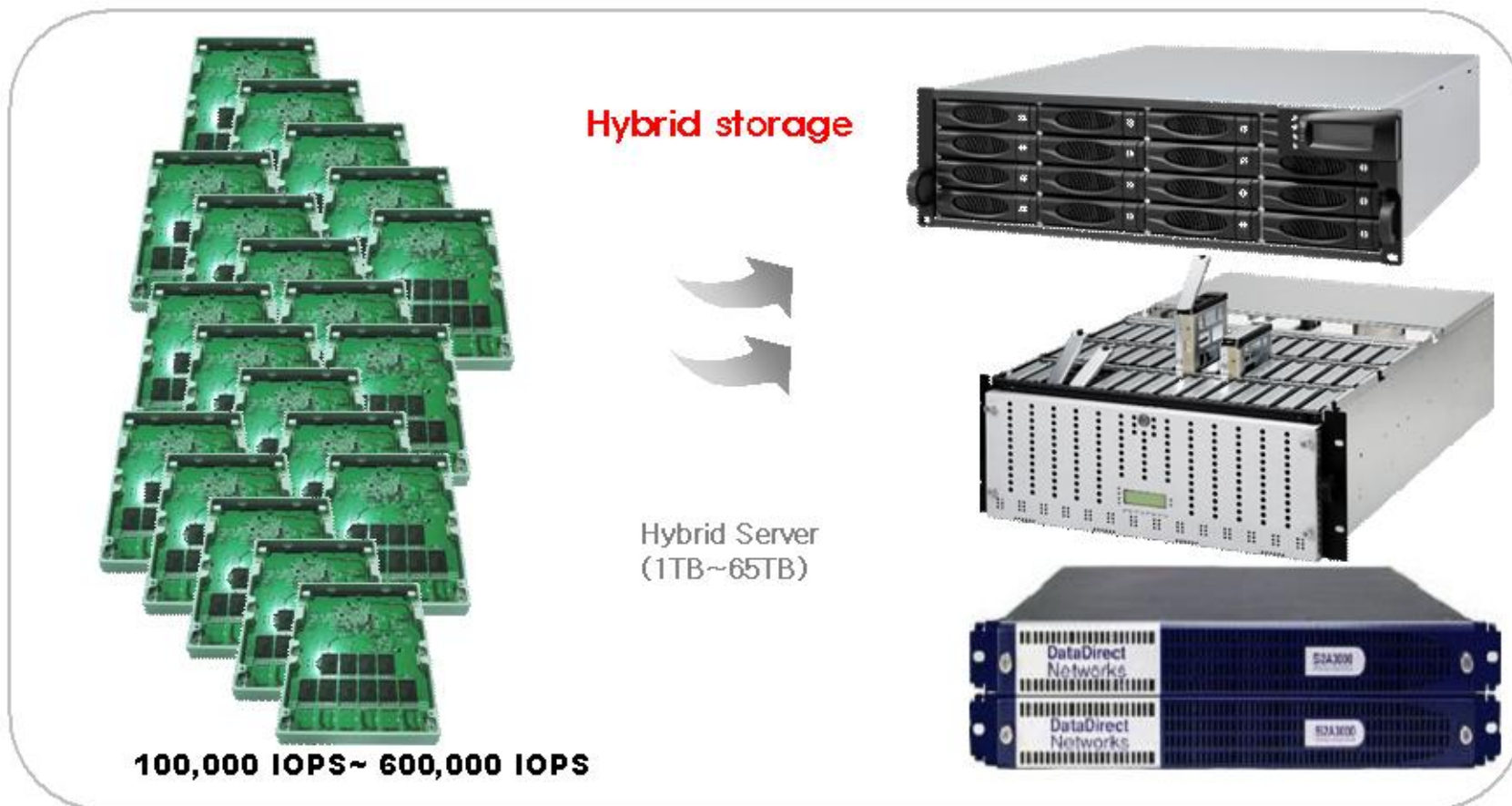
- **Embed memmory disk** to current server.
- Performance will be upgraded up to **5~10 Times. (RAID 1, 5 base)**



## 2. Hybrid Storage(상표출원번호:4020070032588)




### ◆ Concept of Hybrid Storage

**Embed memory disk** to current storage.  
Performance will be upgraded up to **10~20 Time. (RAID 5 base)**



### 3. 제품 소개




◆ SSD(Solid State DISK) 를 탑재한 대용량 Hybrid server

제품명	 D1500	 D2500	 D4850
최대 용량	<b>32GB(up to 192GB)</b>	<b>64GB(up to 320B)</b>	<b>128G(up to 320GB)</b>
Network Interface	Full-duplex 4GB/s FC * 2EA or 10g Ethernet Card * 1	Full-duplex 4Gb/s FC *2EA or 10g Ethernet Card * 1	Full-duplex 4Gb/s FC * 2EA or 10g Ethernet Card * 2
Disk interface	SATA	SATA	SATA
RAID	<a href="#">RAID1 or 5 base</a> (0, 1, 10)	<a href="#">RAID5 base</a> (0, 1, 10)	<a href="#">RAID5 base</a> (0, 1, 10)
network Bandwidth	<b>최대 500MBytes/sec</b>	<b>최대 600Bytes/sec</b>	<b>최대 700MBytes/sec</b>
SSD bandwidth	570MByte/sec (3.5" SSD 3개, RAID5)	700MByte/sec (3.5" SSD 5개, RAID5)	800MByte/sec (3.5" SSD 5개, RAID5)
최대 지원 디스크 (bay)	6 (권장 2~3)	5	5
DISK MTBF	2,000,000시간 이상 보장		
price			
적용분야	<b>Web 서버, WAS서버, 방화벽서버, Cache 서버 등(기존 서버 5배 성능 개선)</b>		

\* 서버 성능(CPU) 및 network 환경에 따라 성능에 차이가 있을 수 있습니다.

### 3. 제품 소개 계속

◆ SSD(Solid State DISK) 를 탑재한 대용량 Hybrid Storage

제품명	 S3160	 S3160A	 S4320
최대 용량	512GB(up to 1TB)	1TB(up to 1TB)	1TB(up to 3TB)
Host Port	Full-duplex 4GB/s FC * 2EA	Full-duplex 4GB/s FC * 4EA	Full-duplex 4Gb/s FC *2EA
Disk interface	SATA	SATA (Dual RAID)	SATA
Cache (Max)	1GB Raid-Protected	2GB Raid-Protected	2GB Raid-Protected
Host bandwidth	<b>최대 800MBytes/sec</b> [DAS, NAS]	<b>최대 1,400MBytes/sec</b> [DAS, NAS]	<b>최대 800Bytes/sec</b> [DAS, NAS]
Storage bandwidth	700MByte/sec	1600MByte/sec	800MByte/sec
디스크 (bay)	16	16	42
DISK MTBF	2,000,000시간 이상 보장		
Price			
적용분야	<b>IPTV , VOD, UCC</b> 등 대용량 <b>Stream or FTP Service</b> 및 <b>IOPS</b> 서버		

\* 서버 성능 및 DAS, NAS, SAN 환경에 따라 성능에 차이가 있을 수 있습니다.

## 4. Hybrid Server Testing 자료[IOPS]

## SSD 5 DISK (Raid 5)

### ◆ Intel SR2500AL(D2500)



### ◆ Hybrid Server Spec & Testing Tool

- CPU : 5130 \* 1
- memory : 2GB
- **SSD(3) : 32GB \* 5 (RAID 5)**
- IO Meter 2004. 7.30 version
  - . Stress point : Out/Standing : 3~5
  - . Worker : 4

	RAID5_SW_RR100				RAID5_HW_RR100				RAID0_HW_RR100			
Size (Byte)	IOPS /sec	Bandwidth H(MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth h(MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth (MB/sec)	Access Time(ms)	CPU (%)
512B	49487,00	24,16	0,16	51,91	55983,00	27,34	0,48	33,46	43658,00	21,32	0,36	37,30
1KB	46650,00	45,56	0,17	46,72	55507,00	54,21	0,49	26,79	43399,00	42,38	0,36	37,73
<b>2KB</b>	<b>41549,00</b>	<b>81,15</b>	<b>0,19</b>	<b>43,74</b>	<b>54445,00</b>	<b>106,34</b>	<b>0,49</b>	<b>29,12</b>	<b>42735,00</b>	<b>83,47</b>	<b>0,37</b>	<b>38,35</b>
<b>4KB</b>	<b>33411,00</b>	<b>130,51</b>	<b>0,23</b>	<b>35,46</b>	<b>52067,00</b>	<b>203,39</b>	<b>0,50</b>	<b>27,7</b>	<b>40722,00</b>	<b>159,07</b>	<b>0,39</b>	<b>35,56</b>
<b>8KB</b>	<b>23634,00</b>	<b>184,65</b>	<b>0,33</b>	<b>25,03</b>	<b>44028,00</b>	<b>343,97</b>	<b>0,62</b>	<b>20,92</b>	<b>31497,00</b>	<b>246,08</b>	<b>0,50</b>	<b>30,39</b>
16KB	14833,00	231,77	0,53	15,97	30699,00	479,68	0,99	13,01	19726,00	308,22	0,81	19,99
32KB	8511,00	265,99	0,93	11,6	14613,00	456,67	1,74	8,82	11347,00	354,60	1,40	11,11
64KB	4702,00	293,90	1,70	9,27	7775,00	485,96	3,20	4,86	6136,00	383,50	2,60	5,27
<b>128KB</b>	<b>2626,00</b>	<b>328,32</b>	<b>3,04</b>	<b>7,36</b>	<b>4294,00</b>	<b>536,76</b>	<b>5,90</b>	<b>4,63</b>	3351,00	<b>418,99</b>	4,76	4,49
<b>256KB</b>	<b>1449,00</b>	<b>362,32</b>	<b>5,51</b>	<b>3,74</b>	<b>2330,00</b>	<b>582,65</b>	<b>11,10</b>	<b>3,22</b>	1794,00	<b>448,54</b>	8,89	4,59
512KB	737,00	<b>368,57</b>	10,84	5,04	1028,00	<b>514,00</b>	22,01	2,61	908,00	<b>454,35</b>	17,53	2,12
1MB	369,00	<b>368,89</b>	21,61	3,23	520,00	<b>520,51</b>	43,43	2,61	460,00	<b>460,44</b>	34,62	2,18

\* 위 자료는 SSD 32GB \* 5를 RAID5로 구성 하여 Testing한 결과 입니다.

## 4. Hybrid Server Testing 자료[IOPS]

## SSD 5 DISK (Raid 5)

### ◆ Intel SR2500AL(D2500)



#### ◆ 부가 설명

- RAID5\_SW\_SR: soft Raid sequential Read
- RAID5\_HW\_SR: hardware Raid sequential Read
- RAID5\_HW\_SW: hardware Raid Sequential Write
- RAID1\_HW\_RR: hardware Raid Random Read

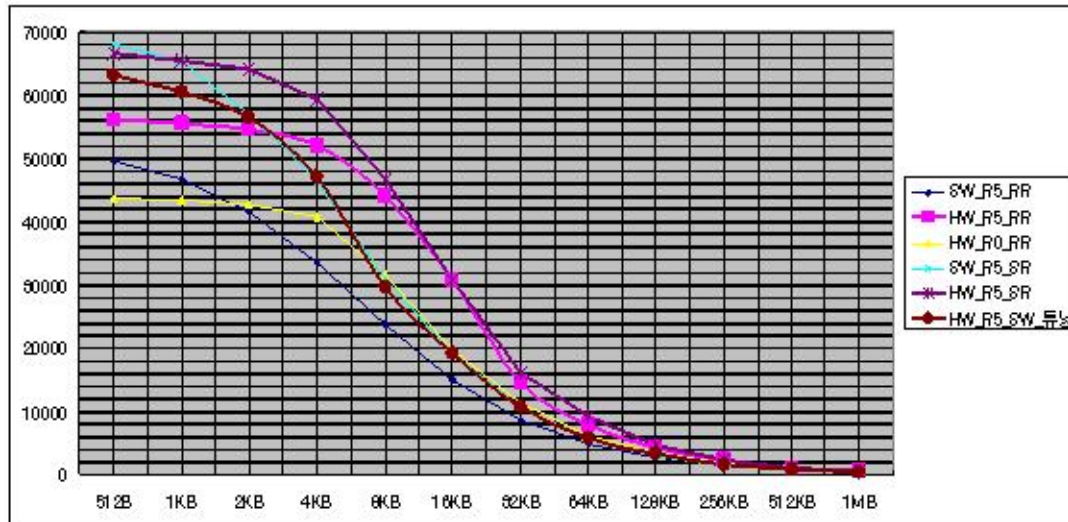
Size (Byte)	RAID5_SW_SR100				RAID5_HW_SR100				RAID5_HW_SW100			
	IOPS /sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)
512B	68013,00	33,21	0,29	69,59	66531,00	32,49	0,30	52,95	63136,00	30,83	0,32	51,47
1KB	65213,00	63,69	0,30	67,02	65408,00	63,88	0,30	52,41	60486,00	59,07	0,33	43,86
<b>2KB</b>	<b>56899,00</b>	<b>111,13</b>	<b>0,35</b>	<b>57,71</b>	<b>64035,00</b>	<b>125,07</b>	<b>0,31</b>	<b>50,56</b>	56361,00	110,08	0,35	48,46
<b>4KB</b>	<b>46238,00</b>	<b>180,62</b>	<b>0,43</b>	<b>47,1</b>	<b>59199,00</b>	<b>231,25</b>	<b>0,33</b>	<b>46,01</b>	47138,00	184,13	0,42	36,70
<b>8KB</b>	<b>31039,00</b>	<b>242,50</b>	<b>0,64</b>	<b>35,1</b>	<b>46679,00</b>	<b>364,68</b>	<b>0,42</b>	<b>38,64</b>	<b>29723,00</b>	232,22	0,67	24,96
16KB	19165,00	299,45	1,04	25,87	30848,00	482,60	0,64	27,18	19220,00	300,32	1,04	19,08
32KB	10491,00	327,85	1,90	15,86	16101,00	<b>503,17</b>	1,24	14,75	10633,00	<b>332,29</b>	1,13	8,92
64KB	5539,00	346,22	4,60	8,36	9153,00	<b>572,07</b>	2,18	9,28	5830,00	<b>364,42</b>	2,06	9,66
<b>128KB</b>	<b>2782,00</b>	347,77	<b>7,18</b>	<b>8,15</b>	<b>4530,00</b>	<b>566,55</b>	<b>4,41</b>	<b>5,53</b>	<b>3170,00</b>	<b>396,33</b>	3,78	8,71
<b>256KB</b>	<b>1371,00</b>	342,86	<b>14,56</b>	<b>6,21</b>	<b>2292,00</b>	<b>573,20</b>	<b>8,72</b>	<b>3,57</b>	<b>1625,00</b>	<b>406,38</b>	7,36	3,89
512KB	714,00	357,18	27,92	5,81	1040,00	<b>519,00</b>	19,22	2,22	840,00	<b>420,02</b>	14,27	5,74
1MB	366,00	<b>366,73</b>	54,50	7	532,00	<b>532,87</b>	37,40	2,84	415,00	<b>415,16</b>	28,87	2,45

\* 위 자료는 SSD 32GB \* 5를 RAID5로 구성 하여 Testing한 결과 입니다.

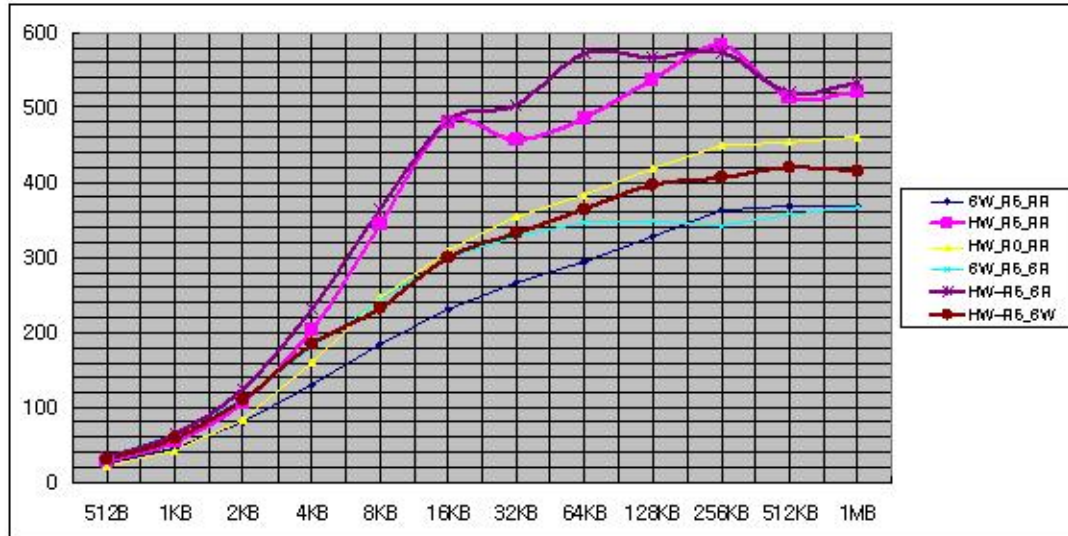
## 4. Hybrid Server Testing 자료(IOPS)

SSD 5 DISK (Raid 5)

### ◆ Intel SR2500AL(D2500)



IOPS



Bandwidth(MB/sec)

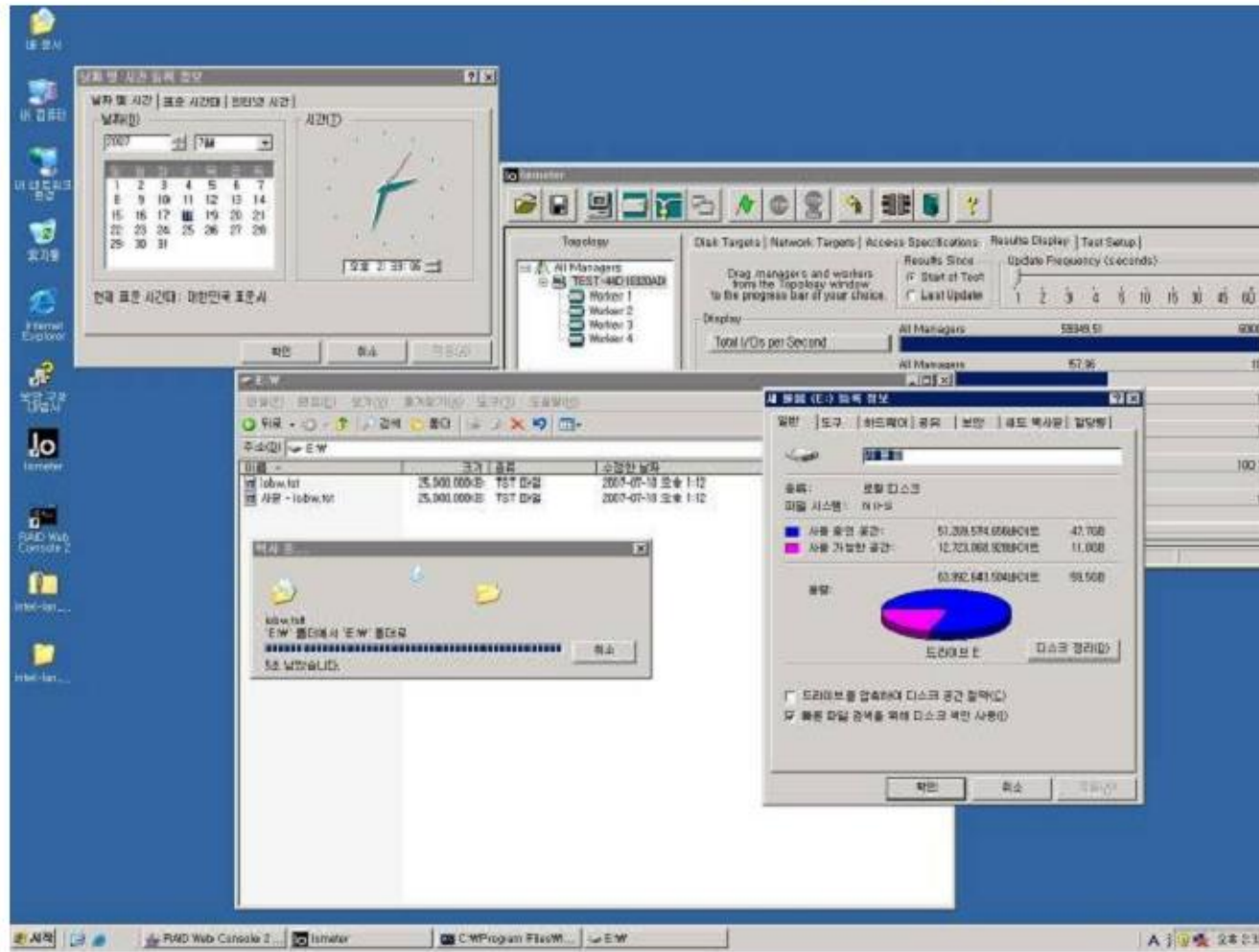
\* 위 자료는 SSD 32GB \* 5를 RAID5로 구성 하여 Testing한 결과 입니다.



## 4. Hybrid Server Testing 자료(IOPS)

◆ Intel SR2500AL (Copy Speed: 25GB 용량, 3DISK, RAID5)

25GByte Copy Running Time : 486초[53MB/sec]



- System Status
  - 2U, 2way
  - 5130 1CPU
  - 1GByte memory
  - **32G SSD 3개(RAID 5)**
- 25Gbyte file copy 시간
  - Starting Time : 14:25:00
  - End Time : 14:33:06
  - **Running Time : 08:06**



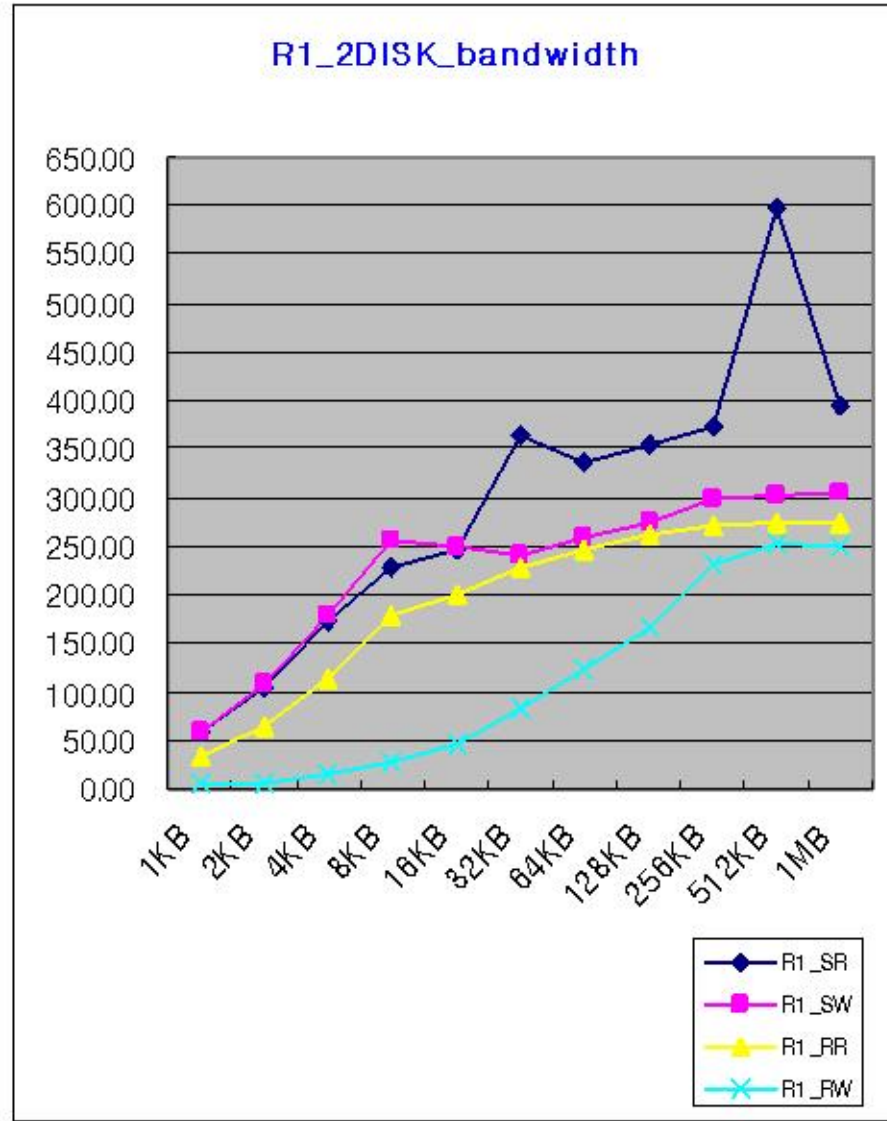
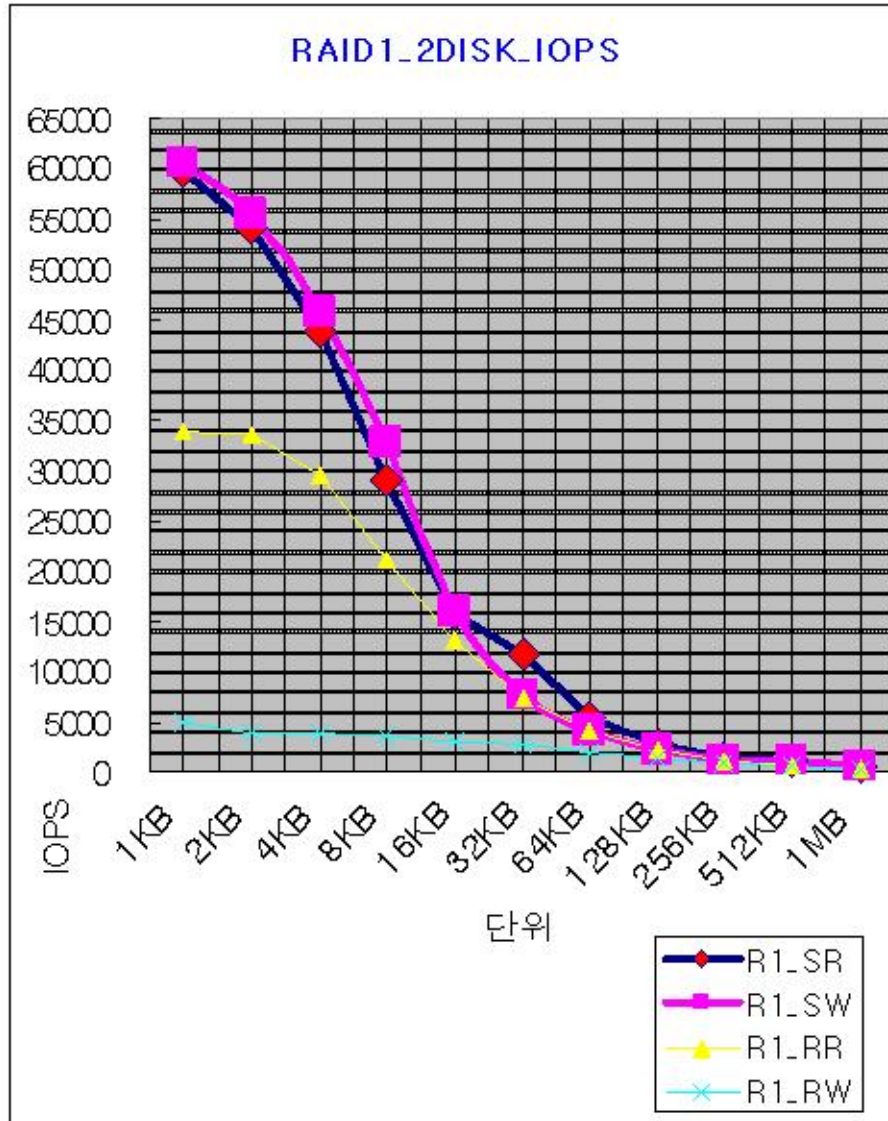
## 4. Hybrid Server Testing 자료(IOPS)

	RAID1_2DISK_SR				RAID1_2DISK_SW				RAID1_2DISK_RR				RAID1_2DISK_RW			
1KB	59859	58.46	0.99	47.7	60577	59.16	0.92	44.99	99909	99.11	0.58	17.91	4919	4.80	0.80	2.19
2KB	54141	105.74	0.96	41.05	55600	108.59	0.95	50.22	88688	65.69	0.59	20.91	8784	7.99	1.05	2.19
4KB	49825	171.19	0.45	67.99	45685	178.46	0.48	66.59	29465	115.10	0.67	15.05	9808	14.88	1.04	2.16
8KB	28996	226.54	0.68	29.9	92799	256.25	0.60	90.65	21056	179.85	0.98	10.59	9492	26.82	1.16	1.88
16KB	15728	245.76	1.27	12.19	15929	248.80	1.25	11.65	12870	201.11	1.55	7.47	2920	45.64	1.96	2.8
32KB	11658	364.92	1.71	14.19	7861	299.42	2.60	5.75	7925	228.99	2.72	2.98	2649	82.60	1.50	1.86
64KB	5955	394.89	9.79	6.12	4149	258.97	4.82	7.6	9944	246.59	5.06	2.55	1967	122.96	2.02	1.49
128KB	2827	959.45	7.07	6.12	2201	275.19	9.07	2.87	2099	262.47	9.50	2.59	1997	167.14	2.98	0.98
256KB	1488	972.02	19.42	2.69	1192	298.14	16.69	9.77	1080	270.24	18.44	2.09	924	291.19	4.91	1.21
512KB	1199	596.50	18.68	4.95	1059	901.00	18.92	9.75	547	279.81	96.91	1.72	504	252.12	7.92	1.06
1MB	505	999.11	92.25	9.96	497	905.21	95.21	9.01	274	274.69	71.14	2.11	250	250.62	15.94	1.09

	RAID5_3DISK_SR				RAID5_3DISK_SW				RAID5_3DISK_RR				RAID5_3DISK_RW			
Size (Byte)	IOPS /sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)	IOPS/sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)	IOPS /sec	Bandwidth (MB/sec)	Access Time (ms)	CPU (%)
1KB	56112	54.80	0.95	95.02	55895	54.59	0.95	92.95	59604	52.95	0.97	45.99	9217	9.00	1.88	7.11
2KB	56155	109.68	0.95	29.59	52198	101.88	0.98	24.64	52454	102.45	0.98	48.51	10598	20.58	1.88	9.08
4KB	46214	180.59	0.49	24.49	49187	168.70	0.46	24.2	50162	195.95	0.99	97.75	10970	40.51	1.91	9.72
8KB	90864	241.19	0.64	18.91	91199	249.29	0.64	15.9	49476	999.66	0.45	97.57	8920	65.00	2.99	7.89
16KB	19992	208.92	1.49	7.59	18296	285.88	1.09	14.92	90498	475.76	0.65	25.24	6980	109.07	2.88	5.96
32KB	10995	941.79	1.82	5.29	11256	951.76	1.77	7.9	16259	508.10	1.22	17.95	5671	177.24	9.49	6.98
64KB	7920	495.04	2.52	5.59	6294	999.40	9.17	4.51	8898	552.40	2.26	9.16	4965	272.88	4.50	4.51
128KB	4299	597.46	4.64	5.66	9981	422.66	5.90	5.44	4725	590.66	4.22	6.99	9899	479.20	5.20	5.85
256KB	2181	545.42	9.15	9.65	1721	490.92	11.60	9.19	2481	620.29	8.04	6.58	2114	528.56	9.45	9.98
512KB	1104	552.14	18.06	4.1	866	499.29	29.02	2.17	1164	582.42	17.10	6.72	1057	528.56	18.82	4.46
1MB	469	489.70	42.24	1.74	498	498.08	45.47	1.97	588	589.95	99.40	9.74	505	501.29	95.56	9.21

## 4. Hybrid Server Testing 자료[IOPS]

### SSD 2 DISK (Raid 1):미러



## 4. Hybrid Server Testing 자료[IOPS]

### SSD 3 DISK (Raid 5)

