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# 슈퍼컴퓨터 4호기(대용량컴퓨팅시스템) 배치 스케줄러 구성 보고서

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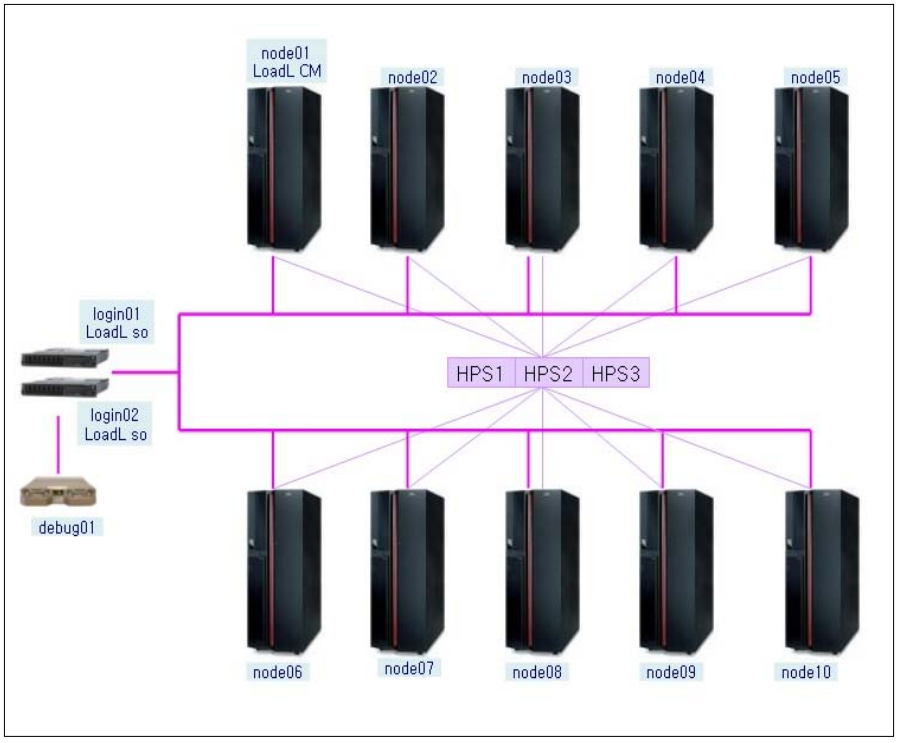
# 목 차

1. IBM 시스템 LoadL 구성

현재 설치 버전 : 3.4.1.3

안정성 테스트 종료 후 update 할 버전 3.4.2.1

2. 슈퍼컴퓨터 4호기 IBM 시스템 LoadL 구성도




LoadLeveler Central Manager node는 node01로 설정되어 있고, login01, login02는 Submit Only node로 설정 되어 있다.

## 3. LoadL Configuration 구성

### 가. LoadL_admin 파일

3호기 시스템과 비교했을 때, ADAPTER STANZA에 SNI interface 가 설정됨을 확인할 수 있다. 주의할 점은, "llextRPD" 명령이나, "/usr/sni/aix53/debugtools/sni_qry" 명령을 통해서 각 SNI interface 마다 정확한 Logical ID를 설정해야 한다. Network ID는 single HPS Network 일 경우, '1'로 설정한다.

```
# DEFAULTS FOR MACHINE, CLASS, USER, AND GROUP STANZAS:
default:  type = machine
          central_manager = false  # default not central manager
          schedd_host = false      # default not a public scheduler, set true
when using submit_only nodes
default:  type = class             # default class stanza
          wall_clock_limit = 00:30:00 # default wall clock limit
default:  type = user              # default user stanza
          maxjobs = 4              # default maximum jobs user is allowed to run
simultaneously
          maxidle = 4              # default maximum idle jobs user is allowed
          maxqueued = 8            # default maximum jobs user is allowed on
system queue
# MACHINE STANZAS:
login01: type = machine
         alias = clsn101
         adapter_stanzas = clsn101 login01
         submit_only = true
         resources = ConsumableCpus(0) ConsumableMemory(0)
node01: type = machine
         adapter_stanzas = clsn01 node01 cl01s0 cl01s1 cl01s2 cl01s3
cl01ml0
         spacct_excluse_enable = false
         alias = cl01s0 cl01s1 cl01s2 cl01s3 cl01ml0 clsn01
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
         schedd_host = true
         central_manager = true
```

```
node02: type = machine
        adapter_stanzas = clsn02 node02 cl02s0 cl02s1 cl02s2 cl02s3
cl02ml0
        spacct_excluse_enable = false
        alias = cl02s0 cl02s1 cl02s2 cl02s3 cl02ml0 clsn02
        resources = ConsumableCpus(64) ConsumableMemory(220gb)
# ADAPTER STANZAS: (optional)
cl01ml0: type = adapter
        adapter_name = ml0
        network_type = multilink
        interface_address = 20.20.50.1
        interface_netmask = 255.255.255.0
        interface_name = cl01ml0
        multilink_list = sn0,sn1,sn2,sn3
node01: type = adapter
        adapter_name = en1
        network_type = ethernet
        interface_address = 150.183.143.31
        interface_netmask = 255.255.255.0
        interface_name = node01
cl01s0: type = adapter
        adapter_name = sn0
        network_type = switch
        interface_address = 20.20.10.1
        interface_netmask = 255.255.255.0
        interface_name = cl01s0
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 6
        network_id = 1
        device_driver_name = sni0
        multilink_address = 20.20.50.1
cl01s1: type = adapter
        adapter_name = sn1
        network_type = switch
        interface_address = 20.20.20.1
        interface_netmask = 255.255.255.0
        interface_name = cl01s1
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 22
        network_id = 1
        device_driver_name = sni1
        multilink_address = 20.20.50.1
cl01s2: type = adapter
        adapter_name = sn2
        network_type = switch
```

```
        interface_address = 20.20.30.1
        interface_netmask = 255.255.255.0
        interface_name = cl01s2
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 8
        network_id = 1
        device_driver_name = sni2
        multilink_address = 20.20.50.1
cl01s3: type = adapter
        adapter_name = sn3
        network_type = switch
        interface_address = 20.20.40.1
        interface_netmask = 255.255.255.0
        interface_name = cl01s3
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 24
        network_id = 1
        device_driver_name = sni3
        multilink_address = 20.20.50.1
clsn01: type = adapter
        adapter_name = en0
        network_type = ethernet
        interface_address = 10.10.10.1
        interface_netmask = 255.255.255.0
        interface_name = clsn01
```

나. LoadL_config 파일

Resource Set 개념이 추가 되었으며, 유저 작업이 노드에 할당될 때 되도록이면, 같은 MCM내의 CPU, MCM과 동일 Set으로 이루어진 memory, adapter를 사용하게 된다. 즉, HPS adapter 도 특정 MCM과 Resource Set으로 구성되어지게 되어 Bandwidth가 크게 향상된다.

```
# Machine Description
ARCH = R6000
# Specify LoadLeveler Administrators here:
LOADL_ADMIN = loadl  root
# Default to starting LoadLeveler daemons when requested
START_DAEMONS = TRUE
# Machine authentication
MACHINE_AUTHENTICATE = FALSE
# Specify which daemons run on each node
SCHEDD_RUNS_HERE          =          True
STARTD_RUNS_HERE          =          True
# Specify information for backup central manager
CENTRAL_MANAGER_HEARTBEAT_INTERVAL = 45
CENTRAL_MANAGER_TIMEOUT = 30
# Specify pathnames
RELEASEDIR        = /usr/lpp/LoadL/full
LOCAL_CONFIG      = $(tilde)/local/$(host)/LoadL_config.local
ADMIN_FILE        = $(tilde)/LoadL_admin
LOG               = $(tilde)/local/$(host)/log
SPOOL             = $(tilde)/local/$(host)/spool
EXECUTE           = $(tilde)/local/$(host)/execute
HISTORY           = $(SPOOL)/history
BIN               = $(RELEASEDIR)/bin
LIB               = $(RELEASEDIR)/lib
# Specify port numbers
MASTER_STREAM_PORT       = 9616
NEGOTIATOR_STREAM_PORT = 9614
SCHEDD_STREAM_PORT       = 9605
STARTD_STREAM_PORT       = 9611
COLLECTOR_DGRAM_PORT     = 9613
STARTD_DGRAM_PORT        = 9615
MASTER_DGRAM_PORT        = 9617
```

```
# Specify a scheduler type:  LL_DEFAULT, API, BACKFILL, GANG
#GANG_MATRIX_TIME_SLICE = 60
PREEMPTION_SUPPORT = full
DEFAULT_PREEMPT_METHOD = su
PREEMPT_CLASS[realtime] = ENOUGH{economy}
# Hierarchical Communication
HIERARCHICAL_FANOUT = 2
                .
                .
# Reservation Setup (2007.10.23)#
MAX_RESERVATIONS = 10
RESERVATION_CAN_BE_EXCEEDED = true
RESERVATION_MIN_ADVANCE_TIME = 0
RESERVATION_PRIORITY = HIGH
RESERVATION_SETUP_TIME = 60
#Rset_support for MCM Affinity (2007.10.23)
RSET_SUPPORT = RSET_MCM_AFFINITY
```

다. HPS vs. MCM Resource Set

아래 명령어로 확인할 수 있다.

각 SNI interface 별 window 사용량도 확인 가능하다.

```
 node01:/> llstatus -a

================================================================
================
 node10
 en0(ethernet,clsn10,10.10.10.10,)
 en1(ethernet,node10,150.183.143.40,)
 networks(striped,cl10ml0,20.20.50.10,,-1,192/256,3192/3192                rCxt
Blks,1,READY)
 network1(aggregate,,,20.20.50.10,-1,192/256,3192/3192 rCxt Blks,1,READY)
 sn3(switch,cl10s3,20.20.40.10,20.20.50.10,35,47/64,798/798                rCxt
Blks,1,READY,MCM3)
 sn2(switch,cl10s2,20.20.30.10,20.20.50.10,47,47/64,798/798                rCxt
Blks,1,READY,MCM3)
 sn1(switch,cl10s1,20.20.20.10,20.20.50.10,27,49/64,798/798                rCxt
Blks,1,READY,MCM1)
```

```
 sn0(switch,cl10s0,20.20.10.10,20.20.50.10,11,49/64,798/798                    rCxt
Blks,1,READY,MCM1)
 ml0(multilink,cl10ml0,20.20.50.10,)
                    .
                    .
```

라. 3호기 및 4호기에서 사용자 코드 컴파일 및 수행상의 차이점

1) instances 는 CPU당 사용할 수 있는 window 개수를 지정한다.

2) mcm_affinity_options : resource set 사용을 위한 다양한 옵션을 제공한다.

=> mcm_mem_pref : memory affinity를 사용

=> mcm_sni_none : adapter affinity를 사용하지 않음

=> mcm_sni_pref : adapter affinity를 사용

=> mcm_distribute : 동일 MCM 내의 CPU보다는 여러 MCM 내의 CPU를 사용하게 함

=> mcm_accumulate : 동일 MCM 내의 CPU를 사용하게 함

| | 3호기 시스템 | 4호기 시스템 |
|---|---|---|
| 추천되는 컴파일 옵션 | -O3 -qarch=pwr4<br>-qtune=pwr4 | -O3 -qarch=pwr5 -qtune=pwr5 |
| MPI or Hybrid<br>작업시 network 옵션<br>(job command file) | #@ Network.MPI =<br>csss,shared,US | # @ network.MPI =<br>sn_all,shared,US,,instances=2 |
| MPI or Hybrid<br>작업시 추가 옵션<br>(job command file) | | # @ rset =<br>RSET_MCM_AFFINITY<br># @ mcm_affinity_options =<br>mcm_mem_pref<br>mcm_sni_none mcm_distribute<br>export<br>MEMORY_AFFINITY=MCM |

### 3) 4호기 Job command file sample

```
#!/bin/ksh
# @ error = loadl.exam.err
# @ output = loadl.exam.out
# @ class = p_normal
# @ job_type = parallel
# @ env_copy = all
# @ network.MPI = sn_single,shared,US,,instances=2
# @ rset = RSET_MCM_AFFINITY
# @ mcm_affinity_options = mcm_mem_pref mcm_sni_none mcm_distribute
# @ resources = ConsumableCpus(1) ConsumableMemory(2gb)
# @ wall_clock_limit=2:00:00
## @ node = 10
# @ tasks_per_node = 64
# @ queue
export MP_SHARED_MEMORY=yes
export XLSMPOPTS="spins=0:yields=0"
export MEMORY_AFFINITY=MCM
run_program
```

## <부록 1> LoadL_admin 파일 상세

```
# Default stanzas are used to set specifications for fields which are
# not specified.
# Class, user, group, and adapter stanzas are optional.  Refer to
# Using and Administering LoadLeveler for  detailed information about
# keywords and associated values.  Also see LoadL_admin.1 in the
# ~loadl/samples directory for sample stanzas.
################################################################################
# DEFAULTS FOR MACHINE, CLASS, USER, AND GROUP STANZAS:
# Remove initial # (comment), and edit to suit.
#
default: type = machine
                central_manager = false    # default not central manager
                schedd_host = false         # default not a public scheduler,
set true when using submit_only nodes
#               submit_only = false        # default not a submit-only machine
#               speed = 1                  # default machine speed
#               cpu_speed_scale = false  # scale cpu limits by speed
#               resources = ConsumableCpus(32)

default: type = class              # default class stanza
#               priority = 0               # default ClassSysprio
#               max_processors = -1         # default max processors for class
(no limit)
wall_clock_limit = 00:30:00 # default wall clock limit
#               default_resources = ConsumableCpus(1)

default: type = user               # default user stanza
#               priority = 0               # default UserSysprio
##              default_class  =  No_Class  #  default  class  =  No_Class  (not
optional)
#               default_group  =  No_Group  #  default  group  =  No_Group  (not
optional)
#               maxjobs = 8                 #  default  maximum  jobs  user  is
allowed to run simultaneously
                maxjobs = 4                 #  default  maximum  jobs  user  is
allowed to run simultaneously
                maxidle = 4                # default maximum idle jobs user is
allowed
                maxqueued = 8               #  default  maximum  jobs  user  is
allowed on system queue
```

```
            default_interactive_class = interact #default for interactive
class.
# Reservation Setup (2007.07.19)
            max_reservation_duration = -1
#            reservation_permitted = false
            max_reservations = 2
default: type = group              # default group stanza
#               priority = 0              # default GroupSysprio
#               maxjobs = -1               #  default  maximum  jobs  group  is
allowed
                                          # to run simultaneously (no limit)
#               maxqueued = -1             #  default  maximum  jobs  group  is
allowed
                                          # on system queue (no limit).  does
not
                                          # limit jobs submitted.
##############################################################################
# MACHINE STANZAS:
# These are the machine stanzas; the first machine is defined as
# the central manager.  mach1:, mach2:, etc. are machine name labels -
# revise these placeholder labels with the names of the machines in the
# pool, and specify any schedd_host and submit_only keywords and values
# (true or false), if required.
##############################################################################
gaia: type = machine
#       alias = clsn101
       adapter_stanzas = gaia
       submit_only = true
       resources = ConsumableCpus(0) ConsumableMemory(0)
gaiab: type = machine
       alias = clsn101
       adapter_stanzas = clsn101 gaiab
       submit_only = true
       resources = ConsumableCpus(0) ConsumableMemory(0)
gaiac: type = machine
       alias = clsn102
       adapter_stanzas = clsn102 gaiac
       submit_only = true
       resources = ConsumableCpus(0) ConsumableMemory(0)
gaia01: type = machine
       adapter_stanzas = clsn01 gaia01 cl01s0 cl01s1 cl01s2 cl01s3 cl01ml0
       spacct_excluse_enable = false
       alias = cl01s0 cl01s1 cl01s2 cl01s3 cl01ml0 clsn01
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
```

```
       schedd_host = true
       central_manager = true
gaia02: type = machine
       adapter_stanzas = clsn02 gaia02 cl02s0 cl02s1 cl02s2 cl02s3 cl02ml0
       spacct_excluse_enable = false
       alias = cl02s0 cl02s1 cl02s2 cl02s3 cl02ml0 clsn02
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia03: type = machine
       adapter_stanzas = clsn03 gaia03 cl03s0 cl03s1 cl03s2 cl03s3 cl03ml0
       spacct_excluse_enable = false
       alias = cl03s0 cl03s1 cl03s2 cl03s3 cl03ml0 clsn03
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia04: type = machine
       adapter_stanzas = clsn04 gaia04 cl04s0 cl04s1 cl04s2 cl04s3 cl04ml0
       spacct_excluse_enable = false
       alias = cl04s0 cl04s1 cl04s2 cl04s3 cl04ml0 clsn04
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia05: type = machine
       adapter_stanzas = clsn05 gaia05 cl05s0 cl05s1 cl05s2 cl05s3 cl05ml0
       spacct_excluse_enable = false
       alias = cl05s0 cl05s1 cl05s2 cl05s3 cl05ml0 clsn05
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia06: type = machine
       adapter_stanzas = clsn06 gaia06 cl06s0 cl06s1 cl06s2 cl06s3 cl06ml0
       spacct_excluse_enable = false
       alias = cl06s0 cl06s1 cl06s2 cl06s3 cl06ml0 clsn06
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia07: type = machine
       adapter_stanzas = clsn07 gaia07 cl07s0 cl07s1 cl07s2 cl07s3 cl07ml0
       spacct_excluse_enable = false
       alias = cl07s0 cl07s1 cl07s2 cl07s3 cl07ml0 clsn07
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia08: type = machine
       adapter_stanzas = clsn08 gaia08 cl08s0 cl08s1 cl08s2 cl08s3 cl08ml0
       spacct_excluse_enable = false
       alias = cl08s0 cl08s1 cl08s2 cl08s3 cl08ml0 clsn08
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia09: type = machine
       adapter_stanzas = clsn09 gaia09 cl09s0 cl09s1 cl09s2 cl09s3 cl09ml0
       spacct_excluse_enable = false
       alias = cl09s0 cl09s1 cl09s2 cl09s3 cl09ml0 clsn09
         resources = ConsumableCpus(64) ConsumableMemory(220gb)
gaia10: type = machine
       adapter_stanzas = clsn10 gaia10 cl10s0 cl10s1 cl10s2 cl10s3 cl10ml0
```

```
        spacct_excluse_enable = false
        alias = cl10s0 cl10s1 cl10s2 cl10s3 cl10ml0 clsn10
          resources = ConsumableCpus(64) ConsumableMemory(480gb)

################################################################################
# ADAPTER STANZAS: (optional)
# These are sample adapter stanzas;
# revise labels and attributes for the adapters on your machines.
################################################################################
gaia: type = adapter
        interface_name = gaia
        interface_address = 150.183.146.21
        adapter_name = en4
        network_type = ethernet
gaiab: type = adapter
        interface_name = gaiab
        interface_address = 150.183.146.22
        adapter_name = en2
        network_type = ethernet
clsn101: type = adapter
        interface_name = clsn101
        interface_address = 10.10.10.51
        adapter_name = en0
        network_type = ethernet
gaiac: type = adapter
        interface_name = gaiac
        interface_address = 150.183.146.23
        adapter_name = en2
        network_type = ethernet
clsn102: type = adapter
        interface_name = clsn102
        interface_address = 10.10.10.52
        adapter_name = en0
        network_type = ethernet
cl01ml0: type = adapter
        adapter_name = ml0
        network_type = multilink
        interface_address = 20.20.50.1
          interface_netmask = 255.255.255.0
        interface_name = cl01ml0
        multilink_list = sn0,sn1,sn2,sn3
gaia01: type = adapter
        adapter_name = en2
        network_type = ethernet
```

```
       interface_address = 150.183.146.31
         interface_netmask = 255.255.255.0
       interface_name = gaia01
cl01s0: type = adapter
       adapter_name = sn0
       network_type = switch
       interface_address = 20.20.10.1
         interface_netmask = 255.255.255.0
       interface_name = cl01s0
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 6
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.1
cl01s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.1
         interface_netmask = 255.255.255.0
       interface_name = cl01s1
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 22
       network_id = 1
         device_driver_name = sni1
       multilink_address = 20.20.50.1
cl01s2: type = adapter
       adapter_name = sn2
       network_type = switch
       interface_address = 20.20.30.1
         interface_netmask = 255.255.255.0
       interface_name = cl01s2
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 8
       network_id = 1
         device_driver_name = sni2
       multilink_address = 20.20.50.1
cl01s3: type = adapter
       adapter_name = sn3
       network_type = switch
       interface_address = 20.20.40.1
         interface_netmask = 255.255.255.0
       interface_name = cl01s3
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 24
```

```
       network_id = 1
         device_driver_name = sni3
       multilink_address = 20.20.50.1
clsn01: type = adapter
       adapter_name = en0
       network_type = ethernet
       interface_address = 10.10.10.1
         interface_netmask = 255.255.255.0
       interface_name = clsn01

################################################################################
cl02ml0: type = adapter
       adapter_name = ml0
       network_type = multilink
       interface_address = 20.20.50.2
         interface_netmask = 255.255.255.0
       interface_name = cl02ml0
       multilink_list = sn0,sn1,sn2,sn3
gaia02: type = adapter
       adapter_name = en2
       network_type = ethernet
       interface_address = 150.183.146.32
         interface_netmask = 255.255.255.0
       interface_name = gaia02
cl02s0: type = adapter
       adapter_name = sn0
       network_type = switch
       interface_address = 20.20.10.2
         interface_netmask = 255.255.255.0
       interface_name = cl02s0
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 7
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.2
cl02s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.2
         interface_netmask = 255.255.255.0
       interface_name = cl02s1
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 23
       network_id = 1
```

```
        device_driver_name = sni1
      multilink_address = 20.20.50.2
cl02s2: type = adapter
      adapter_name = sn2
      network_type = switch
      interface_address = 20.20.30.2
        interface_netmask = 255.255.255.0
      interface_name = cl02s2
      adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 9
      network_id = 1
        device_driver_name = sni2
      multilink_address = 20.20.50.2
cl02s3: type = adapter
      adapter_name = sn3
      network_type = switch
      interface_address = 20.20.40.2
        interface_netmask = 255.255.255.0
      interface_name = cl02s3
      adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 25
      network_id = 1
        device_driver_name = sni3
      multilink_address = 20.20.50.2
clsn02: type = adapter
      adapter_name = en0
      network_type = ethernet
      interface_address = 10.10.10.2
        interface_netmask = 255.255.255.0
      interface_name = clsn02

################################################################################
cl03ml0: type = adapter
      adapter_name = ml0
      network_type = multilink
      interface_address = 20.20.50.3
        interface_netmask = 255.255.255.0
      interface_name = cl03ml0
      multilink_list = sn0,sn1,sn2,sn3
gaia03: type = adapter
      adapter_name = en2
      network_type = ethernet
      interface_address = 150.183.146.33
        interface_netmask = 255.255.255.0
```

```
       interface_name = gaia03
cl03s0: type = adapter
       adapter_name = sn0
       network_type = switch
       interface_address = 20.20.10.3
         interface_netmask = 255.255.255.0
       interface_name = cl03s0
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 4
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.3
cl03s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.3
         interface_netmask = 255.255.255.0
       interface_name = cl03s1
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 20
       network_id = 1
         device_driver_name = sni1
       multilink_address = 20.20.50.3
cl03s2: type = adapter
       adapter_name = sn2
       network_type = switch
       interface_address = 20.20.30.3
         interface_netmask = 255.255.255.0
       interface_name = cl03s2
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 2
       network_id = 1
         device_driver_name = sni2
       multilink_address = 20.20.50.3
cl03s3: type = adapter
       adapter_name = sn3
       network_type = switch
       interface_address = 20.20.40.3
         interface_netmask = 255.255.255.0
       interface_name = cl03s3
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 18
       network_id = 1
         device_driver_name = sni3
```

```
       multilink_address = 20.20.50.3
clsn03: type = adapter
       adapter_name = en0
       network_type = ethernet
       interface_address = 10.10.10.3
         interface_netmask = 255.255.255.0
       interface_name = clsn03

################################################################################
cl04ml0: type = adapter
       adapter_name = ml0
       network_type = multilink
       interface_address = 20.20.50.4
         interface_netmask = 255.255.255.0
       interface_name = cl04ml0
       multilink_list = sn0,sn1,sn2,sn3
gaia04: type = adapter
       adapter_name = en2
       network_type = ethernet
       interface_address = 150.183.146.34
         interface_netmask = 255.255.255.0
       interface_name = gaia04
cl04s0: type = adapter
       adapter_name = sn0
       network_type = switch
       interface_address = 20.20.10.4
         interface_netmask = 255.255.255.0
       interface_name = cl04s0
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 5
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.4
cl04s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.4
         interface_netmask = 255.255.255.0
       interface_name = cl04s1
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 21
       network_id = 1
         device_driver_name = sni1
       multilink_address = 20.20.50.4
```

```
cl04s2: type = adapter
       adapter_name = sn2
       network_type = switch
       interface_address = 20.20.30.4
         interface_netmask = 255.255.255.0
       interface_name = cl04s2
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 3
       network_id = 1
         device_driver_name = sni2
       multilink_address = 20.20.50.4
cl04s3: type = adapter
       adapter_name = sn3
       network_type = switch
       interface_address = 20.20.40.4
         interface_netmask = 255.255.255.0
       interface_name = cl04s3
       adapter_type = Switch_Network_Interface_For_HPS
         logical_id = 19
       network_id = 1
         device_driver_name = sni3
       multilink_address = 20.20.50.4
clsn04: type = adapter
       adapter_name = en0
       network_type = ethernet
       interface_address = 10.10.10.4
         interface_netmask = 255.255.255.0
       interface_name = clsn04

################################################################################
cl05ml0: type = adapter
       adapter_name = ml0
       network_type = multilink
       interface_address = 20.20.50.5
         interface_netmask = 255.255.255.0
       interface_name = cl05ml0
       multilink_list = sn0,sn1,sn2,sn3
gaia05: type = adapter
       adapter_name = en2
       network_type = ethernet
       interface_address = 150.183.146.35
         interface_netmask = 255.255.255.0
       interface_name = gaia05
cl05s0: type = adapter
```

```
        adapter_name = sn0
        network_type = switch
        interface_address = 20.20.10.5
          interface_netmask = 255.255.255.0
        interface_name = cl05s0
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 14
        network_id = 1
          device_driver_name = sni0
        multilink_address = 20.20.50.5
cl05s1: type = adapter
        adapter_name = sn1
        network_type = switch
        interface_address = 20.20.20.5
          interface_netmask = 255.255.255.0
        interface_name = cl05s1
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 30
        network_id = 1
          device_driver_name = sni1
        multilink_address = 20.20.50.5
cl05s2: type = adapter
        adapter_name = sn2
        network_type = switch
        interface_address = 20.20.30.5
          interface_netmask = 255.255.255.0
        interface_name = cl05s2
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 0
        network_id = 1
          device_driver_name = sni2
        multilink_address = 20.20.50.5
cl05s3: type = adapter
        adapter_name = sn3
        network_type = switch
        interface_address = 20.20.40.5
          interface_netmask = 255.255.255.0
        interface_name = cl05s3
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 16
        network_id = 1
          device_driver_name = sni3
        multilink_address = 20.20.50.5
clsn05: type = adapter
```

```
        adapter_name = en0
        network_type = ethernet
        interface_address = 10.10.10.5
          interface_netmask = 255.255.255.0
        interface_name = clsn05

################################################################################
cl06ml0: type = adapter
        adapter_name = ml0
        network_type = multilink
        interface_address = 20.20.50.6
          interface_netmask = 255.255.255.0
        interface_name = cl06ml0
        multilink_list = sn0,sn1,sn2,sn3
gaia06: type = adapter
        adapter_name = en2
        network_type = ethernet
        interface_address = 150.183.146.36
          interface_netmask = 255.255.255.0
        interface_name = gaia06
cl06s0: type = adapter
        adapter_name = sn0
        network_type = switch
        interface_address = 20.20.10.6
          interface_netmask = 255.255.255.0
        interface_name = cl06s0
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 15
        network_id = 1
          device_driver_name = sni0
        multilink_address = 20.20.50.6
cl06s1: type = adapter
        adapter_name = sn1
        network_type = switch
        interface_address = 20.20.20.6
          interface_netmask = 255.255.255.0
        interface_name = cl06s1
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 31
        network_id = 1
          device_driver_name = sni1
        multilink_address = 20.20.50.6
cl06s2: type = adapter
        adapter_name = sn2
```

```
        network_type = switch
        interface_address = 20.20.30.6
          interface_netmask = 255.255.255.0
        interface_name = cl06s2
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 1
        network_id = 1
          device_driver_name = sni2
        multilink_address = 20.20.50.6
cl06s3: type = adapter
        adapter_name = sn3
        network_type = switch
        interface_address = 20.20.40.6
          interface_netmask = 255.255.255.0
        interface_name = cl06s3
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 17
        network_id = 1
          device_driver_name = sni3
        multilink_address = 20.20.50.6
clsn06: type = adapter
        adapter_name = en0
        network_type = ethernet
        interface_address = 10.10.10.6
          interface_netmask = 255.255.255.0
        interface_name = clsn06

################################################################################
cl07ml0: type = adapter
        adapter_name = ml0
        network_type = multilink
        interface_address = 20.20.50.7
          interface_netmask = 255.255.255.0
        interface_name = cl07ml0
        multilink_list = sn0,sn1,sn2,sn3
gaia07: type = adapter
        adapter_name = en2
        network_type = ethernet
        interface_address = 150.183.146.37
          interface_netmask = 255.255.255.0
        interface_name = gaia07
cl07s0: type = adapter
        adapter_name = sn0
        network_type = switch
```

```
        interface_address = 20.20.10.7
          interface_netmask = 255.255.255.0
        interface_name = cl07s0
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 12
        network_id = 1
          device_driver_name = sni0
        multilink_address = 20.20.50.7
cl07s1: type = adapter
        adapter_name = sn1
        network_type = switch
        interface_address = 20.20.20.7
          interface_netmask = 255.255.255.0
        interface_name = cl07s1
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 28
        network_id = 1
          device_driver_name = sni1
        multilink_address = 20.20.50.7
cl07s2: type = adapter
        adapter_name = sn2
        network_type = switch
        interface_address = 20.20.30.7
          interface_netmask = 255.255.255.0
        interface_name = cl07s2
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 38
        network_id = 1
          device_driver_name = sni2
        multilink_address = 20.20.50.7
cl07s3: type = adapter
        adapter_name = sn3
        network_type = switch
        interface_address = 20.20.40.7
          interface_netmask = 255.255.255.0
        interface_name = cl07s3
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 42
        network_id = 1
          device_driver_name = sni3
        multilink_address = 20.20.50.7
clsn07: type = adapter
        adapter_name = en0
        network_type = ethernet
```

```
       interface_address = 10.10.10.7
         interface_netmask = 255.255.255.0
       interface_name = clsn07

################################################################################
cl08ml0: type = adapter
       adapter_name = ml0
       network_type = multilink
       interface_address = 20.20.50.8
         interface_netmask = 255.255.255.0
       interface_name = cl08ml0
       multilink_list = sn0,sn1,sn2,sn3
gaia08: type = adapter
       adapter_name = en2
       network_type = ethernet
       interface_address = 150.183.146.38
         interface_netmask = 255.255.255.0
       interface_name = gaia08
cl08s0: type = adapter
       adapter_name = sn0
       network_type = switch
       interface_address = 20.20.10.8
         interface_netmask = 255.255.255.0
       interface_name = cl08s0
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 13
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.8
cl08s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.8
         interface_netmask = 255.255.255.0
       interface_name = cl08s1
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 29
       network_id = 1
         device_driver_name = sni1
       multilink_address = 20.20.50.8
cl08s2: type = adapter
       adapter_name = sn2
       network_type = switch
       interface_address = 20.20.30.8
```

```
        interface_netmask = 255.255.255.0
      interface_name = cl08s2
      adapter_type = Switch_Network_Interface_For_HPS
      logical_id = 39
      network_id = 1
        device_driver_name = sni2
      multilink_address = 20.20.50.8
cl08s3: type = adapter
      adapter_name = sn3
      network_type = switch
      interface_address = 20.20.40.8
        interface_netmask = 255.255.255.0
      interface_name = cl08s3
      adapter_type = Switch_Network_Interface_For_HPS
      logical_id = 43
      network_id = 1
        device_driver_name = sni3
      multilink_address = 20.20.50.8
clsn08: type = adapter
      adapter_name = en0
      network_type = ethernet
      interface_address = 10.10.10.8
        interface_netmask = 255.255.255.0
      interface_name = clsn08

#############################################################################
cl09ml0: type = adapter
      adapter_name = ml0
      network_type = multilink
      interface_address = 20.20.50.9
        interface_netmask = 255.255.255.0
      interface_name = cl09ml0
      multilink_list = sn0,sn1,sn2,sn3
gaia09: type = adapter
      adapter_name = en2
      network_type = ethernet
      interface_address = 150.183.146.39
        interface_netmask = 255.255.255.0
      interface_name = gaia09
cl09s0: type = adapter
      adapter_name = sn0
      network_type = switch
      interface_address = 20.20.10.9
        interface_netmask = 255.255.255.0
```

```
       interface_name = cl09s0
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 10
       network_id = 1
         device_driver_name = sni0
       multilink_address = 20.20.50.9
cl09s1: type = adapter
       adapter_name = sn1
       network_type = switch
       interface_address = 20.20.20.9
         interface_netmask = 255.255.255.0
       interface_name = cl09s1
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 26
       network_id = 1
         device_driver_name = sni1
       multilink_address = 20.20.50.9
cl09s2: type = adapter
       adapter_name = sn2
       network_type = switch
       interface_address = 20.20.30.9
         interface_netmask = 255.255.255.0
       interface_name = cl09s2
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 46
       network_id = 1
         device_driver_name = sni2
       multilink_address = 20.20.50.9
cl09s3: type = adapter
       adapter_name = sn3
       network_type = switch
       interface_address = 20.20.40.9
         interface_netmask = 255.255.255.0
       interface_name = cl09s3
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 34
       network_id = 1
         device_driver_name = sni3
       multilink_address = 20.20.50.9
clsn09: type = adapter
       adapter_name = en0
       network_type = ethernet
       interface_address = 10.10.10.9
         interface_netmask = 255.255.255.0
```

```
        interface_name = clsn09

################################################################################
cl10ml0: type = adapter
        adapter_name = ml0
        network_type = multilink
        interface_address = 20.20.50.10
          interface_netmask = 255.255.255.0
        interface_name = cl10ml0
        multilink_list = sn0,sn1,sn2,sn3
gaia10: type = adapter
        adapter_name = en2
        network_type = ethernet
        interface_address = 150.183.146.40
          interface_netmask = 255.255.255.0
        interface_name = gaia10
cl10s0: type = adapter
        adapter_name = sn0
        network_type = switch
        interface_address = 20.20.10.10
          interface_netmask = 255.255.255.0
        interface_name = cl10s0
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 11
        network_id = 1
          device_driver_name = sni0
        multilink_address = 20.20.50.10
cl10s1: type = adapter
        adapter_name = sn1
        network_type = switch
        interface_address = 20.20.20.10
          interface_netmask = 255.255.255.0
        interface_name = cl10s1
        adapter_type = Switch_Network_Interface_For_HPS
        logical_id = 27
        network_id = 1
          device_driver_name = sni1
        multilink_address = 20.20.50.10
cl10s2: type = adapter
        adapter_name = sn2
        network_type = switch
        interface_address = 20.20.30.10
          interface_netmask = 255.255.255.0
        interface_name = cl10s2
```

```
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 47
       network_id = 1
         device_driver_name = sni2
       multilink_address = 20.20.50.10
cl10s3: type = adapter
       adapter_name = sn3
       network_type = switch
       interface_address = 20.20.40.10
         interface_netmask = 255.255.255.0
       interface_name = cl10s3
       adapter_type = Switch_Network_Interface_For_HPS
       logical_id = 35
       network_id = 1
         device_driver_name = sni3
       multilink_address = 20.20.50.10
clsn10: type = adapter
       adapter_name = en0
       network_type = ethernet
       interface_address = 10.10.10.10
         interface_netmask = 255.255.255.0
       interface_name = clsn10
##############################################################################
# CLASS STANZAS: (optional)
# These are sample class stanzas; small, medium, large, and nqs are sample
# labels for job classes - revise these labels and specify attributes
# to each class.
##############################################################################

normal:  type = class     # class For normal serial jobs
                wall_clock_limit = 72:00:00
                max_processors = 1 # Max Nodes for PVM jobs
                max_node = 1      # Max Nodes for MPI/LAPI jobs
                total_tasks = 1           # 1 for a Sequential Job Class
                default_resources = ConsumableCpus(1)
                priority = 1
             class_comment = "Normal serial job"

bmt:            type = class     # class For normal serial jobs
                wall_clock_limit = 720:00:00
                priority = 2
#               max_protocol_instances = 8 # Added by SY Moon(2007.10.23)
                max_protocol_instances = 4
                include_users =  kbim jhlee zootun alim r626owg
```

```
              class_comment = "Bench Mark Test job"

##interact:      type = class    # class For interactive jobs
##               wall_clock_limit = 24:00:00
##               priority = 2
##                max_protocol_instances = 4
#               include_users = bmt
##              class_comment = "interactive parallel job"

p_normal:                type = class     # class for grand challenge parallel
jobs
                  wall_clock_limit = 72:00:00
                  priority = 2
#               include_users = bmt alim aresto
              class_comment = "Normal Parallel job "

##############################################################################
# GROUP STANZAS: (optional)
# These are sample group stanzas; group1, group2 are sample labels
# for groups - revise these labels and specify attributes to each group.
##############################################################################
#
##############################################################################
# USER STANZAS: (optional, default user stanza not optional)
# These are sample user stanzas; user1, user2, user3 are sample labels
# for users - revise these labels and specify attributes to each user.
##############################################################################
# user1: type = user
#                 priority = 80
#                 default_class = small
#                 default_group = group1
#                 maxjobs = 20
#                 maxqueued = 40
##############################################################################
#lsdyna: type = user
#                 maxjobs = 4
jhlee:            type = user
                  maxjobs = 1
dalechoi:         type = user
                  maxjobs = 1
```

## <부록 2> LoadL_config 파일 상세

```
#
#       Machine Description
#
ARCH = R6000
#
#  Specify LoadLeveler Administrators here:
#
LOADL_ADMIN = loadl  root
#
#       Default to starting LoadLeveler daemons when requested
#
START_DAEMONS = TRUE

#
#       Machine authentication
#
#       If TRUE, only connections from machines in the ADMIN_LIST are accepted.
#       If FALSE, connections from any machine are accepted.  Default if not
#       specified is FALSE.
#
MACHINE_AUTHENTICATE = FALSE

#
#       Specify which daemons run on each node
#
SCHEDD_RUNS_HERE =        True
STARTD_RUNS_HERE =        True

#
# Specify information for backup central manager
#
CENTRAL_MANAGER_HEARTBEAT_INTERVAL = 45
CENTRAL_MANAGER_TIMEOUT = 30

#
# Specify pathnames
#
RELEASEDIR     = /usr/lpp/LoadL/full
LOCAL_CONFIG     = $(tilde)/local/$(host)/LoadL_config.local
ADMIN_FILE     = $(tilde)/LoadL_admin
LOG            = $(tilde)/local/$(host)/log
```

```
SPOOL          = $(tilde)/local/$(host)/spool
#SPOOL         = $(tilde)/spool
EXECUTE          = $(tilde)/local/$(host)/execute
HISTORY          = $(SPOOL)/history
BIN              = $(RELEASEDIR)/bin
LIB              = $(RELEASEDIR)/lib

#
# Specify port numbers
#
MASTER_STREAM_PORT    = 9616
NEGOTIATOR_STREAM_PORT = 9614
SCHEDD_STREAM_PORT    = 9605
STARTD_STREAM_PORT    = 9611
COLLECTOR_DGRAM_PORT   = 9613
STARTD_DGRAM_PORT     = 9615
MASTER_DGRAM_PORT     = 9617

#
# Specify a scheduler type:  LL_DEFAULT, API, BACKFILL, GANG
#   API specifies that internal LoadLeveler scheduling algorithms be
#   turned off and LL_DEFAULT specifies that the original internal
#   LoadLeveler scheduling algorithm be used.
#
SCHEDULER_TYPE = BACKFILL

#
# Specify accounting controls
#
ACCT                     = A_ON A_DETAIL
ACCT_VALIDATION          = $(BIN)/llacctval
GLOBAL_HISTORY           = $(SPOOL)/GLOBAL_HISTORY

#
# Specify prolog and epilog path names
#
#JOB_PROLOG = /system/root/bin/prolog.sh
JOB_EPILOG = /LoadL/epilog.ksh
# JOB_USER_PROLOG =
# JOB_USER_EPILOG =

#
# Refresh AFS token program.
#
```

```
# AFS_GETNEWTOKEN =

#
# Customized mail delivery program.
#
# MAIL =

#
# Customized submit (job command file) filter program.
##
SUBMIT_FILTER = /LoadL/submit_filter.sh

#
# Specify checkpointing intervals
#
MIN_CKPT_INTERVAL    = 3600
MAX_CKPT_INTERVAL    = 7200

# perform cleanup of checkpoint files once a day
# 24 hrs x 60 min/hr x 60 sec/min = 86400 sec/day

CKPT_CLEANUP_INTERVAL = 86400

# sample source for the ckpt file cleanup program is shipped with LoadLeveler
# and is found in:  /usr/lpp/LoadL/full/samples/llckpt/rmckptfiles.c
#
# compile the source and indicate the location of the executable
# as shown in the following example

#CKPT_CLEANUP_PROGRAM = /u/mylladmin/bin/rmckptfiles

#        LoadL_KeyboardD Macros
#
KBDD              = $(BIN)/LoadL_kbdd
KBDD_LOG           = $(LOG)/KbdLog
#MAX_KBDD_LOG       = 64000
# Modified by SY Moon (2002. 6. 19)
MAX_KBDD_LOG       = 640000
KBDD_DEBUG         =

#
# Specify whether to start the keyboard daemon
#
```

```
#X_RUNS_HERE                      = True
#Modified by SY Moon(2002. 6. 18)
X_RUNS_HERE                       = False

#
#               LoadL_StartD Macros
#
STARTD                      = $(BIN)/LoadL_startd
STARTD_LOG                  = $(LOG)/StartLog
#MAX_STARTD_LOG             = 64000
# Modified by SY Moon (2002. 6. 21)
MAX_STARTD_LOG              = 64000000
#STARTD_DEBUG               =
#Modified by SY Moon(2002. 6. 18)
#STARTD_DEBUG               = D_FULLDEBUG D_STARTD
#For Efix Testing
STARTD_DEBUG                = D_KERNEL D_LOCKING D_STARTD
POLLING_FREQUENCY           = 5
POLLS_PER_UPDATE    = 24
JOB_LIMIT_POLICY    = 120
JOB_ACCT_Q_POLICY           = 300
#modified by JHLEE for Preemption Test(20061017)
PROCESS_TRACKING    = TRUE
#PROCESS_TRACKING           = FALSE
PROCESS_TRACKING_EXTENSION = $(BIN)

#
#               LoadL_SchedD Macros
#
SCHEDD                    = $(BIN)/LoadL_schedd
SCHEDD_LOG                = $(LOG)/SchedLog
#MAX_SCHEDD_LOG           = 64000
# Modified by SY Moon (2002. 6. 21)
MAX_SCHEDD_LOG            = 64000000
#SCHEDD_DEBUG             =
#Modified by SY Moon(2002. 6. 18)
#SCHEDD_DEBUG             = D_FULLDEBUG D_SCHEDD
#For Efix Testing
SCHEDD_DEBUG              = D_SCHEDD D_LOCKING
SCHEDD_INTERVAL           = 120

#CLIENT_TIMEOUT           = 30
# Incresed by SY Moon of IBM Korea(2002. 6. 9)
CLIENT_TIMEOUT            = 300
```

```
#
# Negotiator Macros
#
NEGOTIATOR                      = $(BIN)/LoadL_negotiator
#NEGOTIATOR_DEBUG               =
#Modified by SY Moon(2002. 6. 18)
#NEGOTIATOR_DEBUG               =  D_FULLDEBUG  D_NOGOTIATE    !! Not spelled
correctly
NEGOTIATOR_DEBUG         = D_FULLDEBUG D_NEGOTIATE
NEGOTIATOR_LOG                  = $(LOG)/NegotiatorLog
#MAX_NEGOTIATOR_LOG             = 64000
# Modified by SY Moon (2002. 6. 21)
MAX_NEGOTIATOR_LOG              = 64000000
NEGOTIATOR_INTERVAL             = 60
MACHINE_UPDATE_INTERVAL        = 300
NEGOTIATOR_PARALLEL_DEFER       = 300
NEGOTIATOR_PARALLEL_HOLD = 300
NEGOTIATOR_REDRIVE_PENDING      = 90
NEGOTIATOR_RESCAN_QUEUE         = 90
NEGOTIATOR_REMOVE_COMPLETED     = 0
NEGOTIATOR_CYCLE_DELAY        = 0

#
# Sets the interval between recalculation of the SYSPRIO values
# for all the jobs in the queue
#
NEGOTIATOR_RECALCULATE_SYSPRIO_INTERVAL = 0

#
# GSmonitor Macros
#
GSMONITOR                    = $(BIN)/LoadL_GSmonitor
GSMONITOR_DEBUG               =
GSMONITOR_LOG                 = $(LOG)/GSmonitorLog
#MAX_GSMONITOR_LOG              = 64000
# Modified by SY Moon (2002. 6. 19)
MAX_GSMONITOR_LOG              = 64000000

#
# Consumable Resources
#
#SCHEDULE_BY_RESOURCES = ConsumableCpus LicenseA FloatingLicenseX
#SCHEDULE_BY_RESOURCES = ConsumableCpus
```

```
#modified by jhlee for using RDMA(2007.10.22)
SCHEDULE_BY_RESOURCES = ConsumableCpus ConsumableMemory RDMA

# WLM can be used to enforce resource usage for ConsumableCpus and/or
# for ConsumableMemory
#
# or by specifying deactivate, WLM will be deactivated on all nodes in the
# LoadLeveler cluster
#  ENFORCE_RESOURCE_USAGE was commented out by SY Moon, following up PMR
48541.(2002. 6. 21)
#ENFORCE_RESOURCE_USAGE configuration keyword was enabled by Woo, Joon
(2004.4.7)
ENFORCE_RESOURCE_USAGE = ConsumableCpus ConsumableMemory
#ENFORCE_RESOURCE_USAGE = ConsumableCpus
#The below line added for WLM test by jhlee(200606)
ENFORCE_RESOURCE_POLICY = HARD


# the default is false for ENFORCE_RESOURCE_SUBMISSION which means
# allow jobs to be scheduled that do not request any resources
#
# by setting this to true, all jobs must request resources to be scheduled
#ENFORCE_RESOURCE_SUBMISSION = true
# ENFORCE_RESOURCE_SUBMITSSION was set true by Woo Joon (2004. 4. 07)
ENFORCE_RESOURCE_SUBMISSION = TRUE

#FLOATING_RESOURCES = FloatingLicenseX(5) FloatingLicenseZ(2)

#
# Starter Macros
#
STARTER                  = $(BIN)/LoadL_starter
STARTER_DEBUG            =
STARTER_LOG           = $(LOG)/StarterLog
#MAX_STARTER_LOG        = 64000
# Modified by SY Moon (2002. 6. 19)
MAX_STARTER_LOG        = 64000000

#
# LoadL_Master Macros
#
MASTER                   = $(BIN)/LoadL_master
MASTER_LOG               = $(LOG)/MasterLog
#MASTER_DEBUG            =
```

```
# Modified by SY Moon(2002. 6. 19)
MASTER_DEBUG              = D_DAEMON D_THREAD
#MAX_MASTER_LOG           = 64000
# Modified by SY Moon (2002. 6. 19)
MAX_MASTER_LOG            = 64000000
RESTARTS_PER_HOUR         = 12
PUBLISH_OBITUARIES        = TRUE
OBITUARY_LOG_LENGTH       = 25

#
# Specify whether log files are truncated when opened
#
TRUNC_MASTER_LOG_ON_OPEN    = False
TRUNC_STARTD_LOG_ON_OPEN    = False
TRUNC_SCHEDD_LOG_ON_OPEN    = False
TRUNC_KBDD_LOG_ON_OPEN      = False
TRUNC_STARTER_LOG_ON_OPEN   = False
TRUNC_NEGOTIATOR_LOG_ON_OPEN = False
TRUNC_GSMONITOR_LOG_ON_OPEN  = False

#      NQS Directory
#
# For users of NQS resources:
# Specify the directory containing qsub, qstat, qdel
#
# NQS_DIR                 = /usr/bin

#
# Specify Machine's relative priority to run jobs.
#
# CUSTOM_METRIC           =
# CUSTOM_METRIC_COMMAND   =

#
#       Machine control expressions and macros
#

OpSys    : "$(OPSYS)"
Arch     : "$(ARCH)"
Machine  : "$(HOST).$(DOMAIN)"

#
#       Expressions used to control starting and stopping of foreign jobs
#
```

```
MINUTE           = 60
HOUR             = (60 * $(MINUTE))
StateTimer       = (CurrentTime - EnteredCurrentState)

BackgroundLoad           = 0.7
HighLoad         = 1.5
StartIdleTime            = 15 * $(MINUTE)
ContinueIdleTime = 5 * $(MINUTE)
MaxSuspendTime           = 10 * $(MINUTE)
MaxVacateTime            = 10 * $(MINUTE)

KeyboardBusy     = KeyboardIdle < $(POLLING_FREQUENCY)
CPU_Idle = LoadAvg <= $(BackgroundLoad)
CPU_Busy = LoadAvg >= $(HighLoad)

#
#  See Using and Administering LoadLeveler for an explanation of these
#  control expressions
#
# START          : $(CPU_Idle) && KeyboardIdle > $(StartIdleTime)
# SUSPEND        : $(CPU_Busy) || $(KeyboardBusy)
# CONTINUE       : $(CPU_Idle) && KeyboardIdle > $(ContinueIdleTime)
# VACATE : $(StateTimer) > $(MaxSuspendTime)
# KILL           : $(StateTimer) > $(MaxVacateTime)

START            : T
SUSPEND          : F
CONTINUE : T
VACATE           : F
KILL             : F

#
#       Expressions used to prioritize job queue
#
#       Values which can be part of the SYSPRIO expression are:
#
#       QDate              Job submission time
#       UserPrio  User priority
#       UserSysprio        System priority value based on userid (from the user
#                          list file with default of 0)
#       ClassSysprio       System priority value based on job class (from the
#                          class list file with default of 0)
#       GroupSysprio     System priority value based on the group (from the
#                          group list file with default of 0)
```

```
#       GroupQueuedJobs   Number of job steps running or queued for the group
#       GroupRunningJobs  Number of job steps running for the group
#       GroupTotalJobs    Total number of job steps for the group
#       UserQueuedJobs    Number of job steps running or queued for the user
#       UserRunningJobs   Number of job steps running for the user
#       UserTotalJobs     Total number of job steps for the user
#
#       The following expression is an example.
#
#SYSPRIO: (ClassSysprio * 100) + (UserSysprio * 10) + (GroupSysprio * 1)-
(QDate)
#
#       The following (default) expression for SYSPRIO creates a FIFO job
queue.
#
#SYSPRIO: 0 - (QDate)
SYSPRIO: (ClassSysprio * 129600) - (QDate)
# Modified by SY Moon(2002. 7. 16. 13:40)
#SYSPRIO: (ClassSysprio * 43200) - (QDate)

#
#       Expressions used to prioritize machines
#
#       The following example orders machines by the load average
#       normalized for machine speed:
#
#MACHPRIO: 0 - (1000 * (LoadAvg / (Cpus * Speed)))
#
#       The following (default) expression for MACHPRIO orders
#       machines by load average.
#
MACHPRIO: 0 - (LoadAvg)
#
# The MAX_JOB_REJECT value determines how many times a job can be
#       rejected before it is canceled or put on hold.  The default value
# is -1, which indicates no limit to the number of times a job can be
#       rejected.
#
# Changed this value for 10 from -1 on 21th April by Woo, Joon
MAX_JOB_REJECT = -1
#
# When ACTION_ON_MAX_REJECT is HOLD, jobs will be put on user hold
#       when the number of rejects reaches the MAX_JOB_REJECT value.  When
# ACTION_ON_MAX_REJECT is CANCEL, jobs will be canceled when the
```

```
# number of rejects reaches the MAX_JOB_REJECT value. The default
#       value is HOLD.
# Changed this value for CANCEL from HOLD on 21th April by Woo, Joon
ACTION_ON_MAX_REJECT = CANCEL
#
# To enable full exploitation of DCE (authorization and authentication
# checking) uncomment the following keywords.
#
#DCE_ENABLEMENT=TRUE
#DCE_ADMIN_GROUP=LoadL-admin
#DCE_SERVICES_GROUP=LoadL-services
#
# The default DCE_AUTHENTICATION_PAIR used when DCE_ENABLEMENT is
# specified as TRUE is shown below.  If you wish to use the default
# you may leave DCE_AUTHENTICATION_PAIR commented out, or uncomment
# the following line.
#
#DCE_AUTHENTICATION_PAIR = $(BIN)/lldelegate, $(BIN)/llimpersonate
#
# To enable LoadLeveler to support DCE security credential passing
# when DCE_ENABLEMENT is not set to TRUE, uncomment the following
# keyword. You may also choose to uncomment the following line when
# DCE_ENABLEMNT is specified as TRUE to overrride the default
# DCE_AUTHENTICATION_PAIR.:w
#
# An installation can provide its own executables to pass or establish DCE
# security credentials for a LoadLeveler job by replacing the executables
# specified by DCE_AUTHENTICATION_PAIR.
#
#DCE_AUTHENTICATION_PAIR = $(BIN)/llgetdce, $(BIN)/llsetdce
#

# Algorithm a used by the negotiator to determine if a machine has enough
# virtual memory to satisfy the image_size requirement of a job step
#
# can either be FREE_PAGING_SPACE which is the default
# or FREE_PAGING_SPACE_PLUS_FREE_REAL_MEMORY

VM_IMAGE_ALGORITHM = FREE_PAGING_SPACE

# Filesystem Monitor Interval and Threshholds

#modified by jhlee(20060403-migration)
FS_INTERVAL = 30
```

```
FS_NOTIFY =    100MB,200MB
#FS_SUSPEND =   75,80
#FS_TERMINATE = 65,25

# Gang Scheduling-Specific Keywords

#GANG_MATRIX_BROADCAST_CYCLE = 300
#Modified by SY Moon(2002. 7. 11. 14:20)
#GANG_MATRIX_BROADCAST_CYCLE = 300
#GANG_MATRIX_NODE_SUBSET_SIZE = 512
#Modified by SY Moon(2002. 7. 6)
#GANG_MATRIX_NODE_SUBSET_SIZE = 1
#GANG_MATRIX_REORG_CYCLE = 16
#Modified by SY Moon(2002. 7. 10. 17:15)
#GANG_MATRIX_REORG_CYCLE = 16
#GANG_MATRIX_TIME_SLICE = 60
#Modified by SY Moon(2002. 7. 13. 09:15)
#GANG_MATRIX_TIME_SLICE = 60

#Modified by kbim(2006. 10. 16 20:30)
PREEMPTION_SUPPORT = full
DEFAULT_PREEMPT_METHOD = su
#PREEMPT_CLASS[p_realtime] = ENOUGH{p_economy}
##PREEMPT_CLASS[realtime] = ENOUGH{economy}
PREEMPT_CLASS[realtime] = ENOUGH{economy}
#PREEMPT_CLASS[bmt] = ENOUGH{economy}
#PREEMPT_CLASS[p_realtime] = ALL{p_economy}
##PREEMPT_CLASS[realtime] = ENOUGH{normal p_normal p_normal_1.3 p_normal_1.7}
#PREEMPT_CLASS[normal] = ALL{p_economy}
#PREEMPT_CLASS[p_realtime] = ALL{p_economy} ENOUGH{normal p_express p_normal}
#PREEMPT_CLASS[p_realtime] = ALL{p_economy p_express p_normal}
#PREEMPT_CLASS[p_express] = ALL{p_economy}
#PREEMPT_CLASS[p_normal] = ALL{p_economy}
#START_CLASS[p_economy] = (p_economy < 16) && (allclasses < 1)

# Hierarchical Communication

HIERARCHICAL_FANOUT = 2

# Reservation Setup (2006.10.27)#
MAX_RESERVATIONS = 10
RESERVATION_CAN_BE_EXCEEDED = true
RESERVATION_MIN_ADVANCE_TIME = 0
RESERVATION_PRIORITY = HIGH
```

```
RESERVATION_SETUP_TIME = 60
#Rset_support for MCM Affinity (2007.10.23)
RSET_SUPPORT = RSET_MCM_AFFINITY
```