



2 :

(MMORTS)

Massively Multiplayer Game Development 2 : Architecture and Techniques for an MMORTS

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http://www.gamasutra.com/features/20050613/amir_01.shtml

(MMORTS) ,
가 . (MMORPGS)
/ 가 .
가 .
MMORPG (client machines/ TCP/IP)
MMPRTS 가 가
[Jaecheol01] .
(50KB/sec)
(Low-bandwidth)
가 ,
.

가 (AI)

AI

가

가,

가

MMORTS

()

1~2KB/sec

가

(graphics),)

가

(clustering),

, MMORTS

(Basic Techniques)

(avatar)

MMOG

[TNL01]

(pseudocode)

가

:

```

for (each region of map R) do {
  for (each connected player P viewing region R) do
    for (each element E in region R)
      Create message updating element E 's state
}
for (each connected player P) do {
  Compress all messages to player P
  Send messages to player P
}

```

"U"가 (ID),
() (,)
가 ,

가
(, RTS ,
,
) . "U" 가 ,
(route)

(World Segmentation)

가 (, LOS)
(2.8.1), 가
LOS ,
, ([Ferguson01]),
가

	A	B	C	D	E	F	G				A	B	C	D	E	F	G	
1											1							
2											2							
3			b			xx					3		x				bb	
4				A	b						4			A	b			
5			b								5		b					
6			A								6		A					
7				b		x					7			b		x		
8											8							

2.8.1: D4 A 가 E4

. A 가
 . b (), x (
) .

, () .

, (pseudocode)
 :

```

for (each region of map R) do {
  for (each connected player P viewing region R) do
    for (each element E in region R)
      Create message updating element E's state
}
for (each connected player P) do {
  Compress all messages to player P
  Send messages to player P
}

```

(bitfield)

, ()

. 가 " " 가

(가 , (bit)가 ,
가 가). 가 ,
(bitfield) ,
가 (2.8.1).
가 ,
:
4 ;
100 가 , 1,000 가 .
, 가 1 2 1,000
. 6 / (6
bytes/unit) 가 (1 가
: (HP), (mana), xp,
(carried items) ., (ID)
), ,
. MMORTS
,
가 가 가 ()
).

(Advanced Methods for Bandwidth Reduction)

, ,
, 가 , 가
,
가 .
. 가 가 () ,
.
“ ”
(가 가).
가 ,
, () .

RTS

“ ” (, , ,)
 .) (AI)
 ()
 가 . , , (AI)
 (routine) ,
 가 .

, B A A 가
 B ,
 (AI) (dependency bubble)
 , (dependency
 bubble)

MMORTS

:
 , 가
 , 가 ,
 ()
 , 가
 , 가 (A* 가 , 가)
 , (. (tiles) ,
 , (offset)).
 (dependency bubble) ()
 , 가 . B 가
 가 . A ,
 , B , A

	A	B	C	D	E	F	G				A	B	C	D	E	F	G
1										1							
2										2							
3			b			x	x			3		x				b	b
4				b	A	b			→	4			b	A	b		
5			b							5			b				
6			A							6			A				
7				b			x			7				b			x
8										8							

2.8.2: D4 A 가 E4

. A 가
 . CU ()
 PUR ()
 b (), x () .

, 가 PURS
 가
 가
 PURS
 CURS
 PUR/CUR
 가
 (,
).
 CURS
 , PURS CURS 가
 :

```

for (each region of map R) do
  for (each connected player P viewing region R) do
    if (Region is Border for P){

```



```

    for (each element E in region R) do
        Create message updating E ' s state
    }
else (region is Inner for P){
    for (each element E in region R) do {
        if (Prediction fails due to user change)
            Create message updating E ' s state
    }
}
for (each connected player P) do {
    Compress all messages to player P
    Send messages to player P
}

```

, (ID) 가 , U 가 ,
 , ()
 , ()
 가 :
 .
 . () ,
 (RTS ,
).
 . / 가 , (ID)

(world segmentation algorithms)
 RTS /가
 가

(Clustering): MMORTS

:

가 (seamless)

(

(patch)가

-

가

(seam)

).

3D (3D graphics rendering): MMORTS

(, mesh)

(, mesh) , (cache)

(, mesh)

가

(cache)

(

).

(fog-of-war)

가 / 가

(viewed/unviewed)

“

가?”

“

/

가?”

()

(AI):

(tiered approach)

가

(scaled-map)

AI ()

RTS
farm)

(AI)

(server

가

CPU

AI

()

가

CPU RTS , 가
" (opponent) " AI
가 MMORTS
() AI 가

가 , () AI
()

:

가 (Fine-tuning) MMORTS AI

가

CPU

), () ,
(fly) -

가

NPC

NPC

가 가

MMOGs

가

RTS

(AI) " (building)" 가
(routine)

J (Advanced world
segmentation)

(Conclusion)

MMORTS () 가
(12 KB/sec)

(segmentation) ()
(clustering) (AI) MMORTS

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<http://opentnl.sourceforge.net/doxydocs/fundamentals.html#fundamentals>

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(Thor Alexander)가 (Charles River) _____

(2Massively Multiplayer Game Development 2)

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