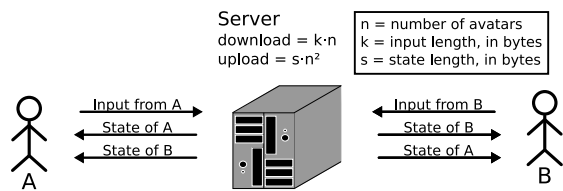
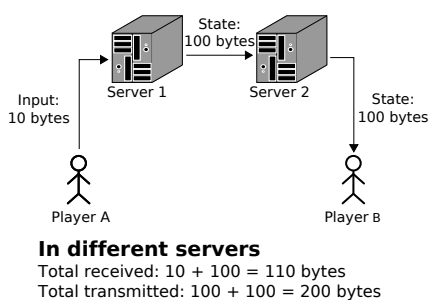
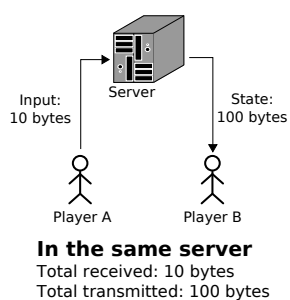
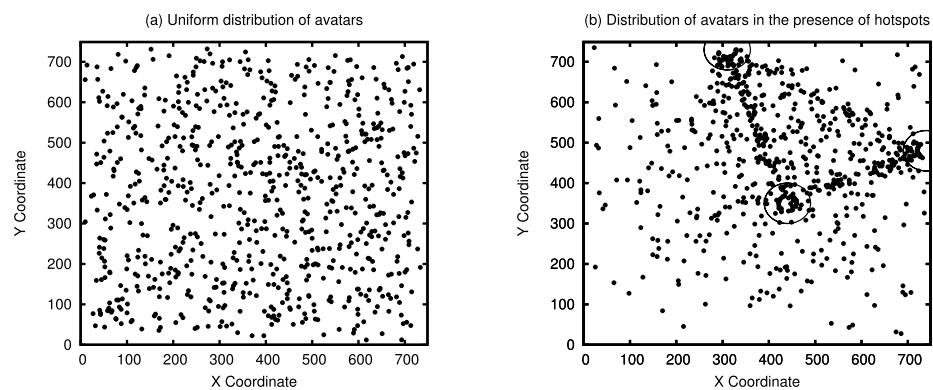


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...





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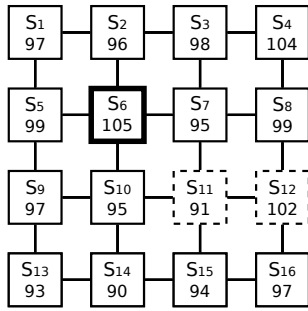
$S_6S_2, S_5, S_7S_{10}S_7S_7S_6S_3, S_6, S_8S_{11}S_6S_{11}S_{11}S_{12}S_{11}S_{10}$

$p(S)$
 $Servers\{S_1, S_2, ..., S_n\}Sfrac{p(S)}{Servers}$

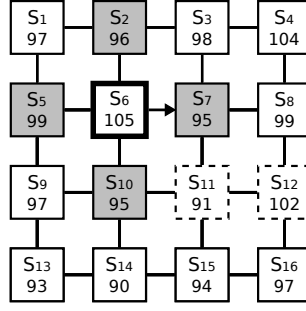
$$frac{p(S)}{n} = \frac{p(S)}{\sum_{i=1}^n p(S_i)}$$

$P_{total}n$

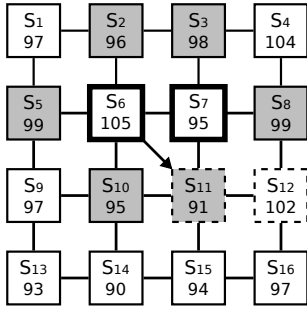
$$P_{total} = \sum_{i=1}^n p(S_i)$$



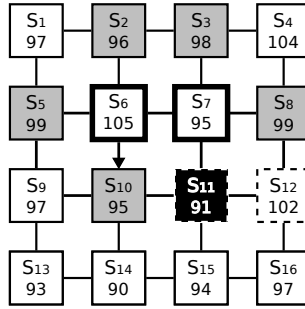
SELECTED = {}
CANDIDATES = {}



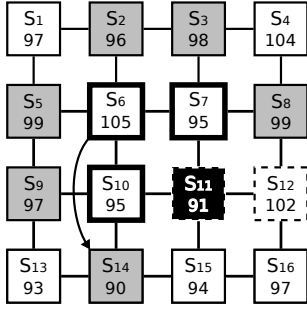
SELECTED = {S6}
CANDIDATES = {S2, S5, S7, S10}
(a)



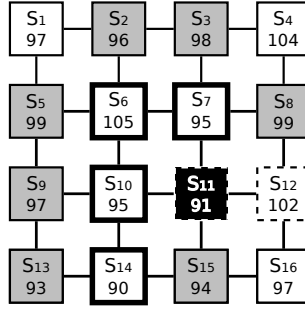
SELECTED = {S6, S7}
CANDIDATES = {S2, S3, S5, S8, S10, S11}
(b)



SELECTED = {S6, S7}
CANDIDATES = {S2, S3, S5, S8, S10}
(c)



SELECTED = {S6, S7, S10}
CANDIDATES = {S2, S3, S5, S8, S9, S14}
(d)



SELECTED = {S6, S7, S10, S14}
CANDIDATES = {S2, S3, S5, S8, S9, S13, S15}
(e)

$$\begin{array}{l} s(R)Rp(s(R)) \\ A_jA_iA_jA_iR(A_i,A_j) \\ Aw_a(A)\{A_1,A_2,...,A_t\} \end{array}$$

$$w_a(A)=\sum_{i=1}^tR(A,Ai)$$

$$C\{A_1,A_2,...,A_n\}\{A_1,A_2,...,A_t\}w_c(C)$$

$$w_c(C)=\sum_{i=1}^nw(Ai)=\sum_{i=1}^n\sum_{j=1}^tR(A_i,A_j)$$

$$R\{C_1,C_2,...,C_p\}R$$

$$w_r(R)=\sum_{i=1}^pw_c(Ci)$$

$$Regions=\{R_1,R_2,...,R_n\}RRegions$$

$$frac_r(R)=\frac{w_r(R)}{\sum\limits_{i=1}^nw_r(R_i)}$$

$$u(s(R))=\frac{w_r(R)}{p(s(R))}$$

$$W_{total}\{C_1,C_2,...,C_w\}$$

$$W_{total}=\sum_{i=1}^w w_c(Ci)$$

$$U_{total}=\frac{W_{total}}{P_{total}}$$

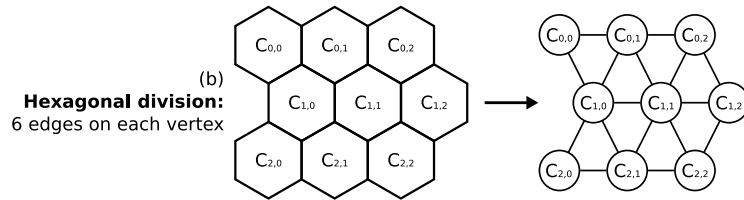
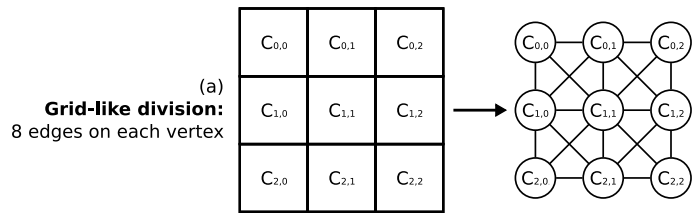
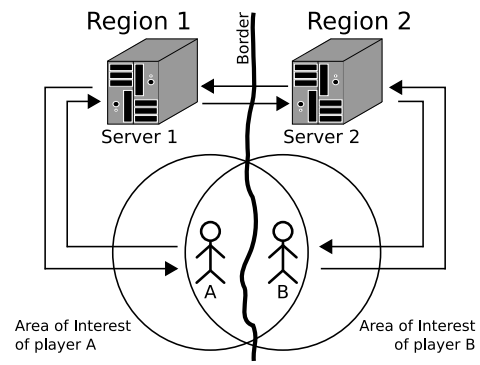
$$C_iC_j$$

$$\begin{array}{l} Int_c(C_i,C_j)=\sum_{i=1}^m\sum_{j=1}^nR(A_i,A_j) \\ A_iC_iA_jC_j \end{array}$$

$$W_{total}A_iP_iS_iA_jP_jS_jP_iP_jS_iA_iS_jP_jR_iR_jR_iR_jmn$$

$$\begin{array}{l} Int_r(R_i,R_j)=\sum_{i=1}^m\sum_{j=1}^nInt_c(C_i,C_j) \\ C_i\in R_iC_j\in R_j \end{array}$$

$$OverHead=\sum_i\sum_{j,j\neq i}Int_r(Ri,Rj)$$



$$GW = (V, E)VE$$

$$GWGW$$

$$GW$$

$$RtolRu(s(R)) > U_{total} \times tolU_{total} > 1$$

$$P_{total} \gg W_{total}$$

$$U_{total}U_{total} \leq 1U_{total} > 1$$

$$U_{total} \leq 1U_{total} > 1U_{total}$$

$$localgroup \leftarrow \{R\}$$

$$localweight \leftarrow w_r(R)$$

$$localcapacity \leftarrow p(s(R))$$

$$averageusage \leftarrow \frac{localweight}{localcapacity}$$

$$averageusage > max(1,U_{total})$$

$$localgroup$$

$$R \leftarrow localgroupu(s(R))$$

$$R \leftarrow p(s(R))$$

$$localweight \leftarrow localweight + w_r(R)$$

$$localcapacity \leftarrow localcapacity + p(s(R))$$

$$averageusage \leftarrow \frac{localweight}{localcapacity}$$

$$localgroup \leftarrow localgroup \cup \{R\}$$

$$localgroup$$

$$\frac{p(s(R))}{freecapacity}$$

$$GW$$

$$S_1S_2p(S_1) = 30p(S_2) = 18W_{total} = 32S_1S_2$$

```

weighttodivide  $\leftarrow$  0
freecapacity  $\leftarrow$  0
Rregionlist
  weighttodivide  $\leftarrow$  weighttodivide +  $w_r(R)$ 
  freecapacity  $\leftarrow$  freecapacity +  $p(s(R))$ 
  R

regionlistp(s(R))
Rregionlist
  weightshare  $\leftarrow$  weighttodivide  $\times$   $\frac{p(s(R))}{freecapacity}$ 
   $w_r(R) < weightshare$ 
  R
    R  $\leftarrow$  R  $\cup$  {Intc(C)}

    R  $\leftarrow$  R  $\cup$  {}

```

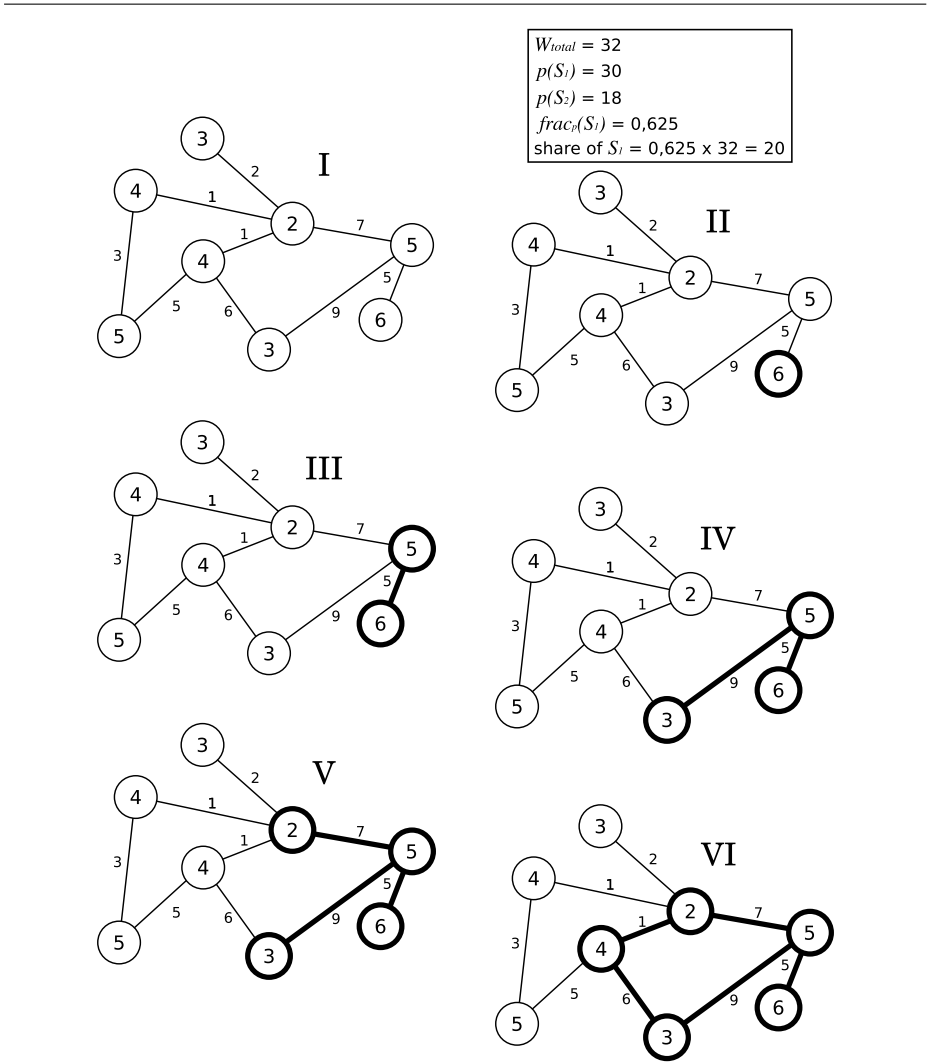
```

weighttodivide  $\leftarrow$  0
freecapacity  $\leftarrow$  0
Rregionlist
  weighttodivide  $\leftarrow$  weighttodivide +  $w_r(R)$ 
  freecapacity  $\leftarrow$  freecapacity +  $p(s(R))$ 
  c  $\leftarrow$  R
  R
    R  $\leftarrow$  R  $\cup$  {c}

regionlistp(s(R))
Rregionlist
  weightshare  $\leftarrow$  weighttodivide  $\times$   $\frac{p(s(R))}{freecapacity}$ 
   $w_r(R) < weightshare$ 
  R
    R  $\leftarrow$  R  $\cup$  {Intc(C)}

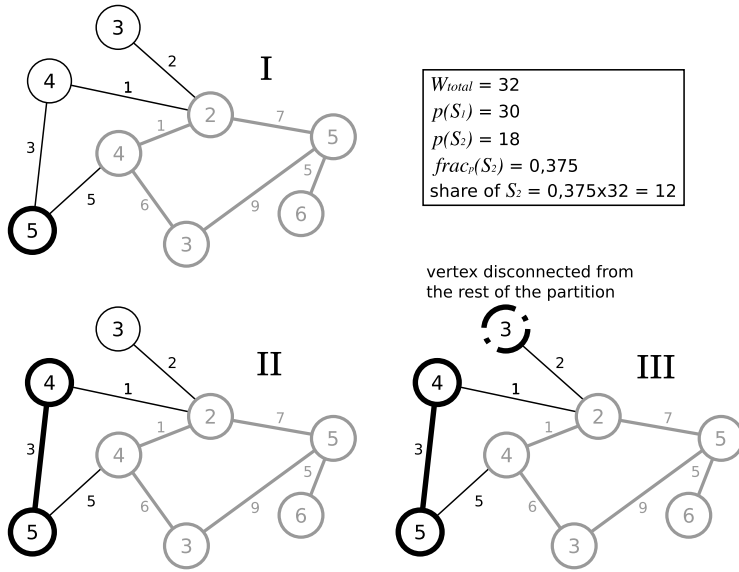
    R  $\leftarrow$  R  $\cup$  {}

```



truefalse

$S_iT_i^m$
 $S_1, S_2, \dots, S_8P(S_i) = i \times 20000$
OverHead



```

weighttodivide ← 0
freecapacity ← 0
Rregionlist
  weighttodivide ← weighttodivide + wr(R)
  freecapacity ← freecapacity + p(s(R))
  celllist ← R
  fracr(R) > fracp(s(R))
  C ← celllist
  CR
  Ccelllist

regionlistu(s(R))
Rregionlist
  weightshare ← weighttodivide ×  $\frac{p(s(R))}{freecapacity}$ 
  wr(R) < weightshare
  R
  R ← R ∪ {Intc(C)}

  R ← R ∪ {}

```

```

 $R_i$ regionlist
weighttolose  $\leftarrow w_r(R_i) - W_{total} \times frac_p(s(R_i))$ 
destinationregions  $\leftarrow regionlist - \{R_i\}$ 
destinationregionsu( $s(R)$ )
 $R_j$ destinationregions
freecapacity  $\leftarrow frac_p(s(R_j)) \times W_{total} - w_r(R_j)$ 
weighttothisregion  $\leftarrow \min(weighttolose, freecapacity)$ 
weighttothisregion > 0
 $R_i C w_c(C) \leq weighttothisregion$ 
 $C \leftarrow R_i weighttothisregion$ 
 $R_i \leftarrow R_i - \{C\}$ 
 $R_j \leftarrow R_j \cup \{C\}$ 
weighttothisregion  $\leftarrow weighttothisregion - w_c(C)$ 
weighttolose  $\leftarrow weighttolose - w_c(C)$ 

 $R_j$ 

```

```

swapped  $\leftarrow$ 
swapped =
swapped  $\leftarrow$ 
 $R_i$ regionlist
 $R_j$ regionlist
KernighanLin( $R_i, R_j$ ) =
swapped  $\leftarrow$ 

```

$$\sigma u(S)\sigma(u(S))$$

$$W_{total} + OverHead$$

