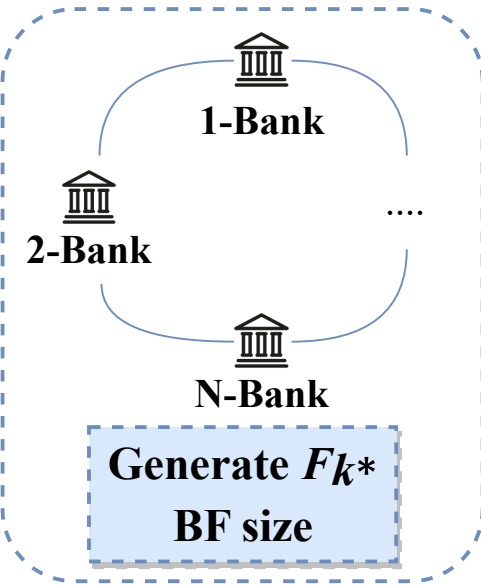


## 1st step



## Bank data

**acc\_info**  
423||22St  
652||31St  
...

## Secure Encoding

$E[h(\text{acc\_info})]$   
4s\$2s424  
2s\$%623  
...

**acc\_info**  
657||2352  
890||635d  
...

$E[h(\text{acc\_info})]$   
s241dsa2  
4saa421\$  
...

**acc\_info** ....  
167||3421  
592||fev3  
...

$E[h(\text{acc\_info})]$   
1dsw45#  
1452fa&4  
...

Local Bloom Filters

0  
1  
0  
...  
0

0  
1  
1  
...  
1

1  
1  
1  
...  
0

Federated  
Aggregation



PNS

Global Bloom Filter

1  
1  
0  
...  
1

## 2nd step



$h(\text{ord.acc\_info})$   
 $h(\text{ben.acc\_info})$   
 $E[h(\text{ord.acc\_info})]$   
 $E[h(\text{ben.acc\_info})]$

DP feature  
extraction

Add Noise

Augmented  
BF Feature

BF	F1	F2	...	Fk
0	B1	B2	...	\$1000
1	B2	B3	...	\$2140
0	B3	B2	...	¥1400

Augmented PNS data

Classifier