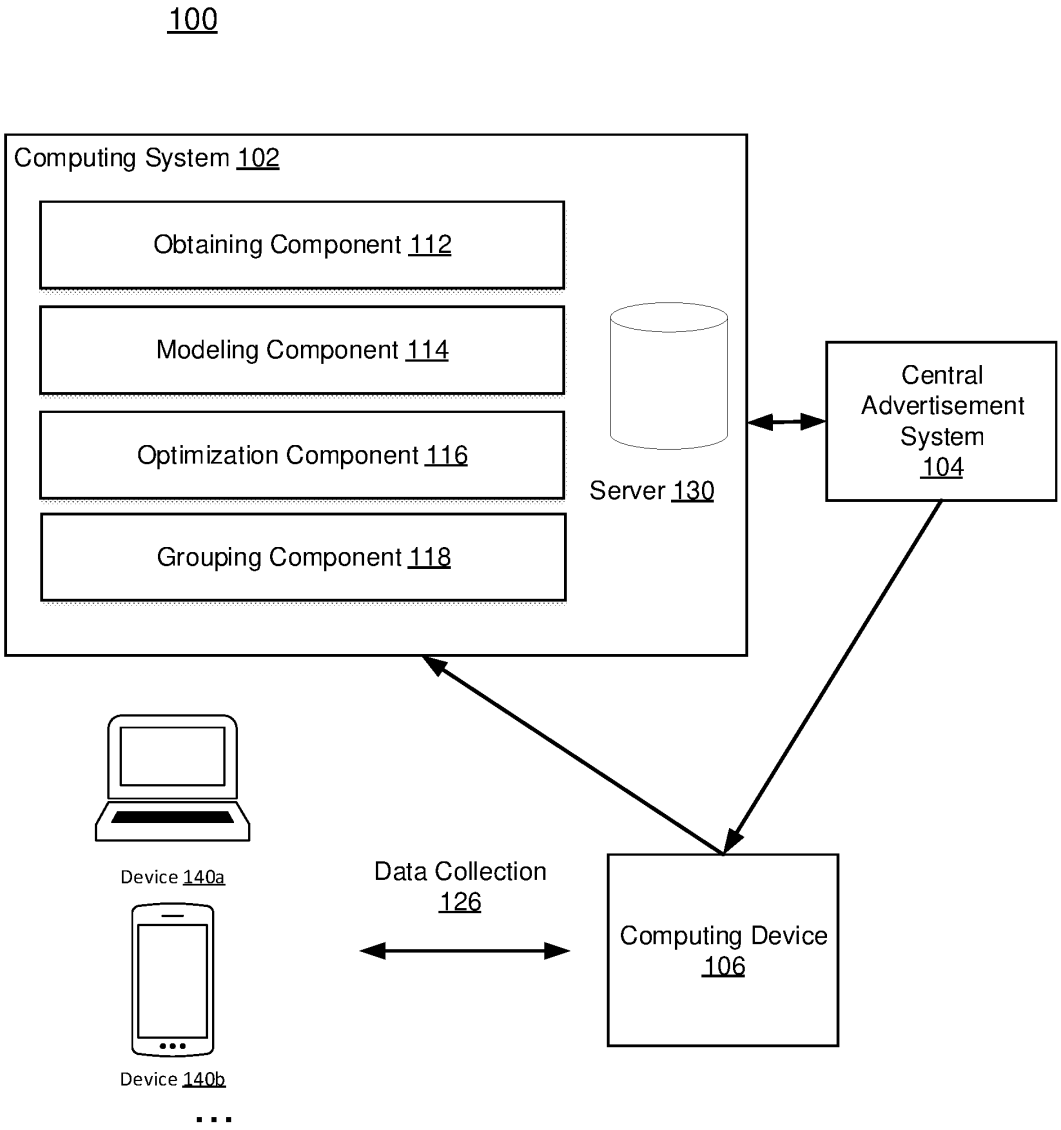
100
Computing System 102
Obtaining Component 112
Modeling Component 114
Optimization Component 116
Grouping Component 118
Server 130
Central Advertisement System 104
Device 140a
Device 140b
Data Collection 126
Computing Device 106

FIG. 1

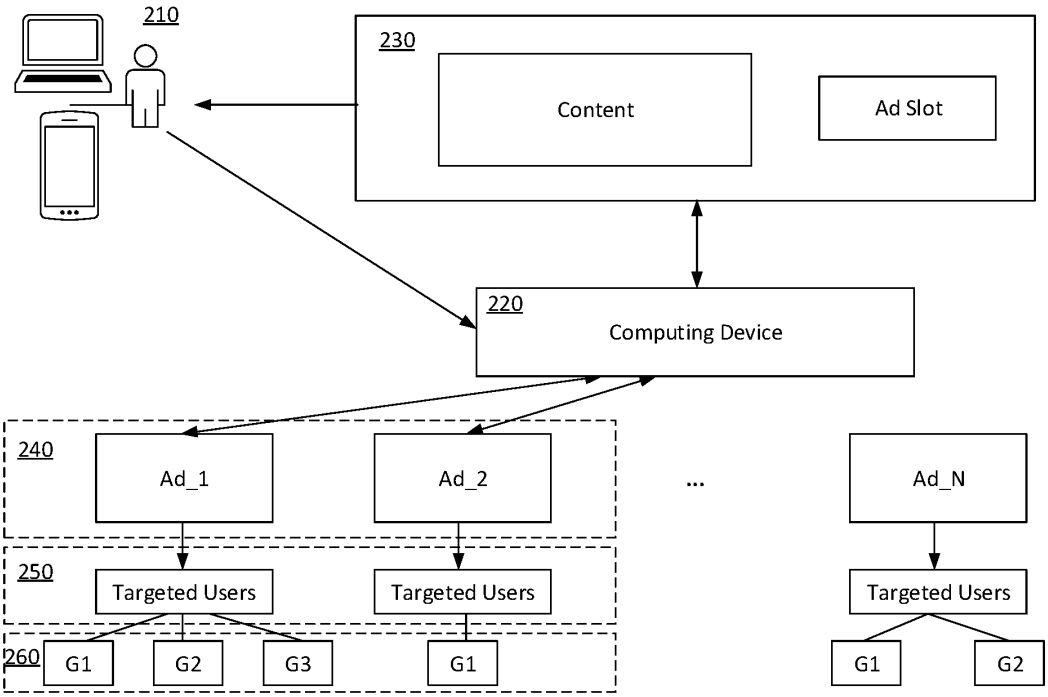
210
230
Content
Ad Slot
220
Computing Device
240
Ad_1
Ad_2
...
Ad_N
250
Targeted Users
Targeted Users
Targeted Users
260
G1
G2
G3
G1
G1
G2

FIG. 2

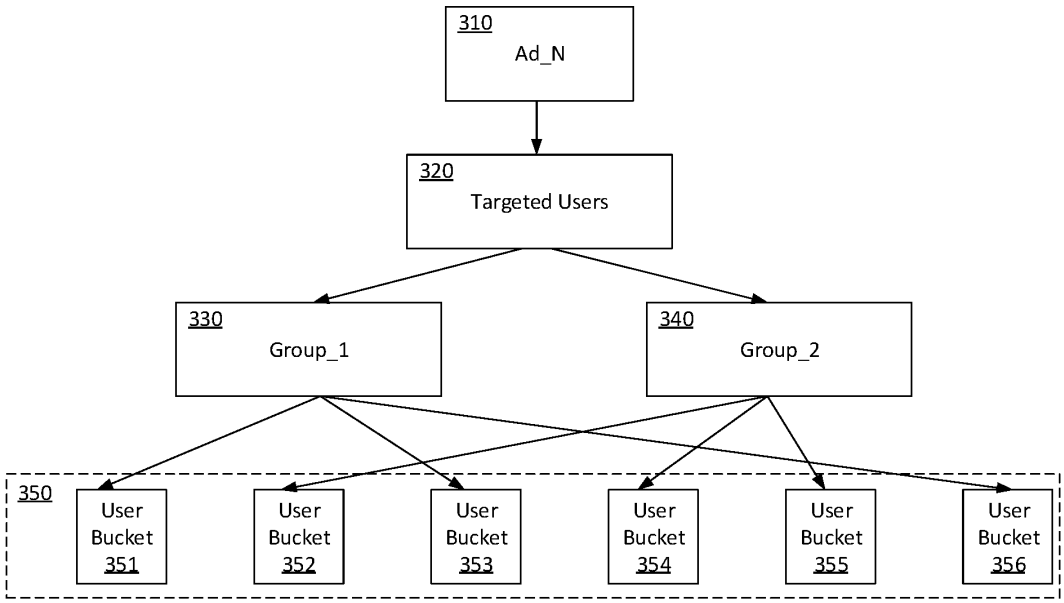
310
Ad_N
320
Targeted Users
330
Group_1
340
Group_2
350
User Bucket 351
User Bucket 352
User Bucket 353
User Bucket 354
User Bucket 355
User Bucket 356

FIG. 3

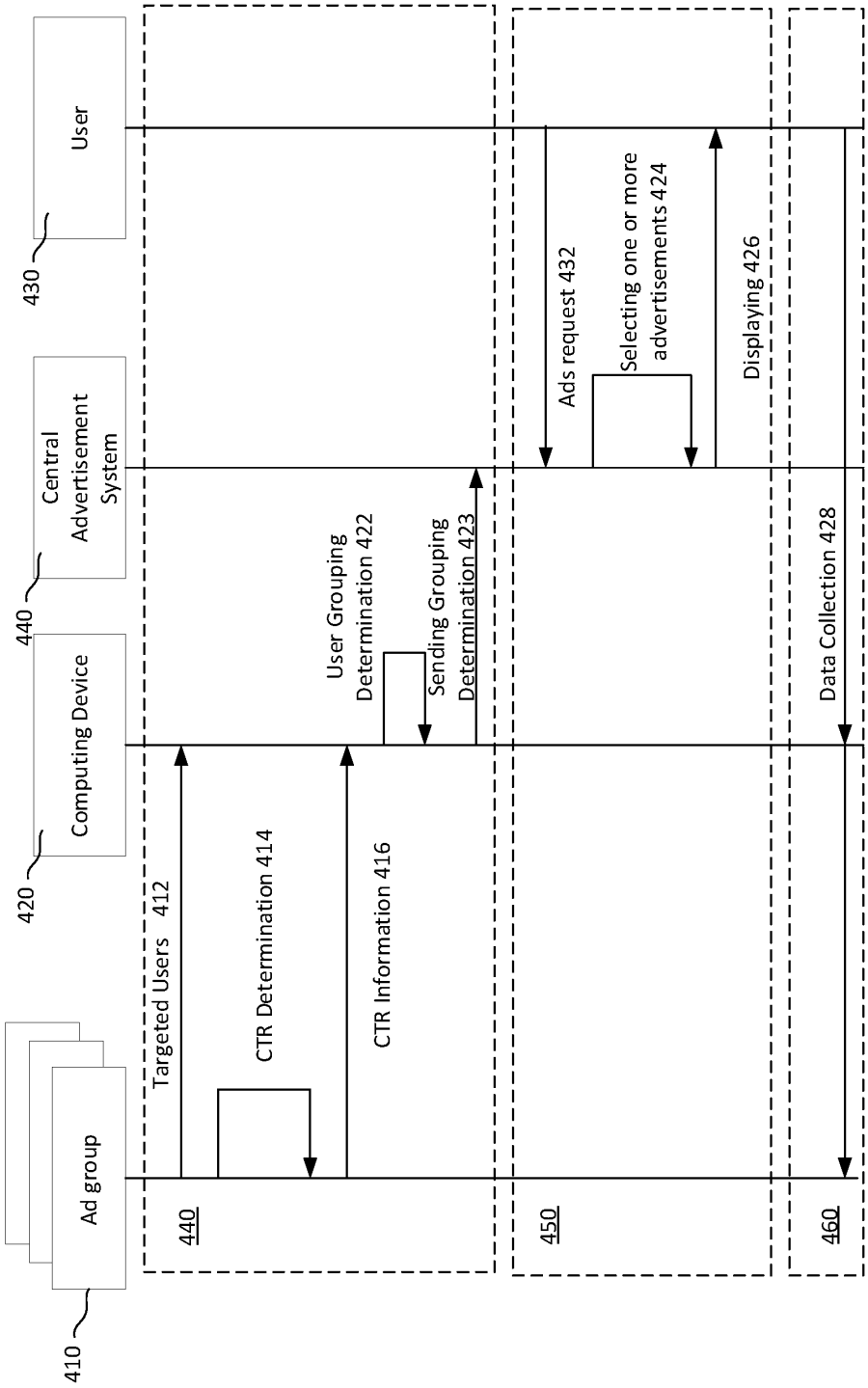
User
430
Central Advertisement System
440
Computing Device
420
Ad group
410
Targeted Users 412
CTR Determination 414
CTR Information 416
User Grouping Determination 422
Sending Grouping Determination 423
Ads request 432
Selecting one or more advertisements 424
Displaying 426
Data Collection 428
440
450
460

FIG. 4

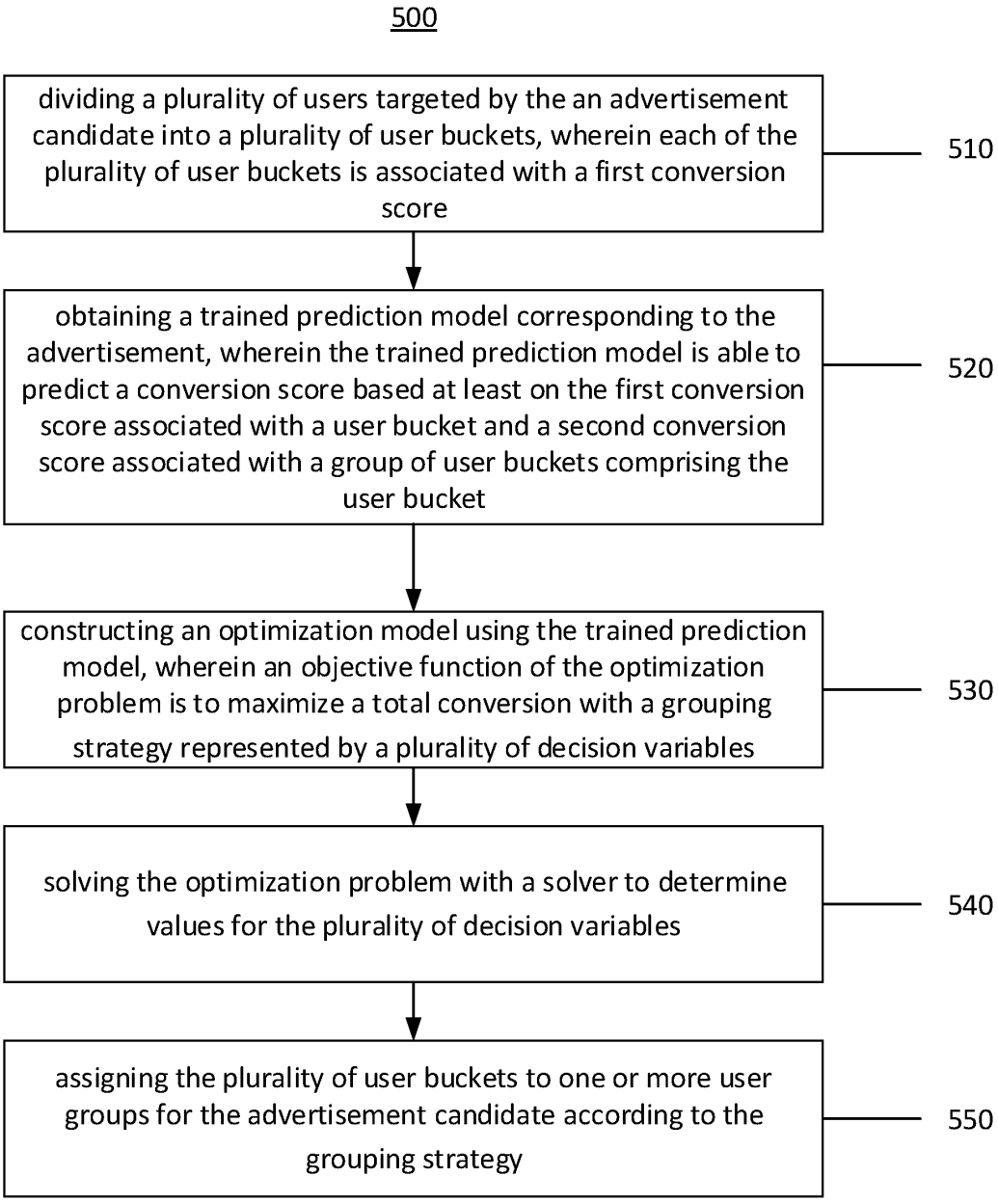
500
dividing a plurality of users targeted by the an advertisement candidate into a plurality of user buckets, wherein each of the plurality of user buckets is associated with a first conversion score
510
obtaining a trained prediction model corresponding to the advertisement, wherein the trained prediction model is able to predict a conversion score based at least on the first conversion score associated with a user bucket and a second conversion score associated with a group of user buckets comprising the user bucket
520
constructing an optimization model using the trained prediction model, wherein an objective function of the optimization problem is to maximize a total conversion with a grouping strategy represented by a plurality of decision variables
530
solving the optimization problem with a solver to determine values for the plurality of decision variables
540
assigning the plurality of user buckets to one or more user groups for the advertisement candidate according to the grouping strategy
550

FIG. 5

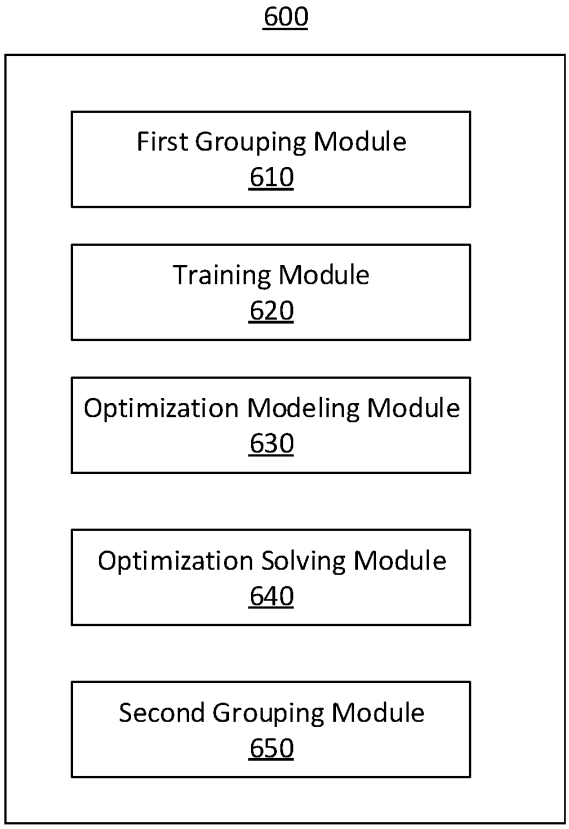
600
First Grouping Module
610
Training Module
620
Optimization Modeling Module
630
Optimization Solving Module
640
Second Grouping Module
650

FIG. 6

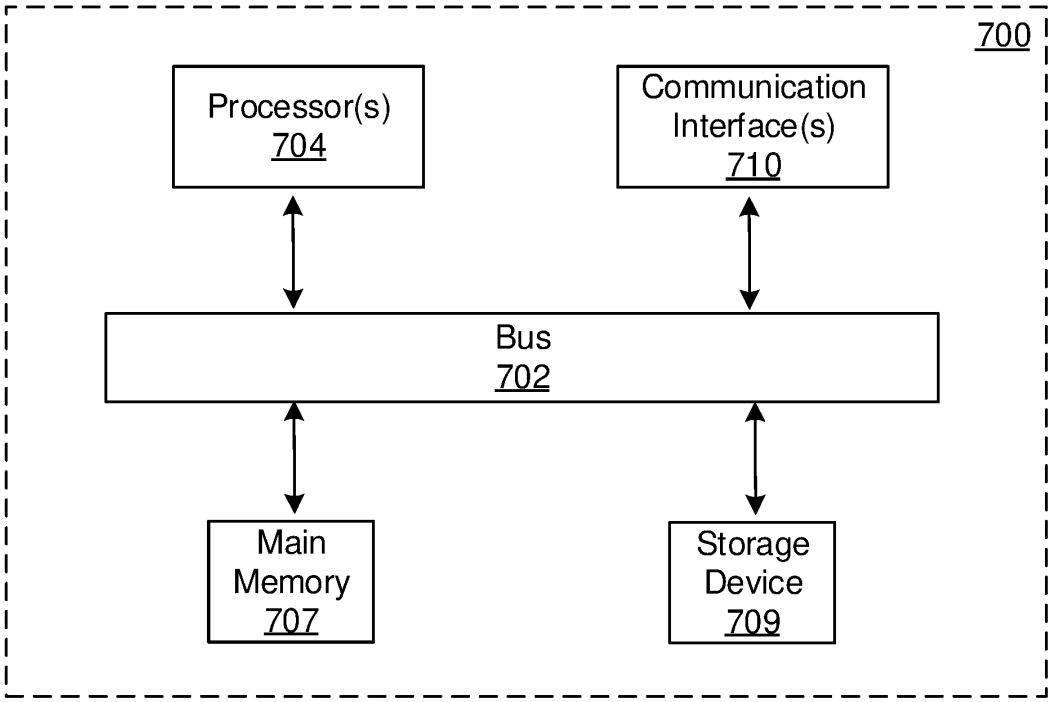
700
Processor(s)
704
Communication Interface(s)
710
Bus
702
Main Memory
707
Storage Device
709

FIG. 7