United States Patent [19]

Woods et al.

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[45] **Date of Patent:** Sep. 21, 1999

[54] **SYSTEM AND METHOD FOR INCREASING PERFORMANCE BY EFFICIENT USE OF LIMITED RESOURCES VIA INCREMENTAL FETCHING, LOADING AND UNLOADING OF DATA ASSETS OF THREE-DIMENSIONAL WORLDS BASED ON TRANSIENT ASSET PRIORITIES**

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[21] Appl. No.: **08/900,471**

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[51] **Int. Cl.**^{6} **G06F 15/00**
[52] **U.S. Cl.** **345/419**; 345/421
[58] **Field of Search** 345/419, 421

[56] **References Cited**

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[57] **ABSTRACT**

A system and method for increasing the performance associated with creating simulated 3D worlds from a network. The system and method provides a means for increasing the performance by fetching objects in the order of their importance. A priority scheme is used to determine the fetching, pre-fetching, and caching of URLs. The operations of assigning priorities, making prefetch requests and cache management is driven by data in an asset database table. The database contains information pertaining to each asset within the current scene such as the priority, status, region, type bounds, and retrieval time. The asset database table is updated based on fetching activities, camera position, and the positions of moving assets. A world scene is subdivided into appropriately sized regions when a scene is first downloaded. Asset type origins are defined and moved, based on the position, orientation, and velocity of the camera. Regions are assigned priorities based on their distance from the asset origin. Assets within particular regions are assigned priorities based on the region priorities and the asset type.

33 Claims, 8 Drawing Sheets
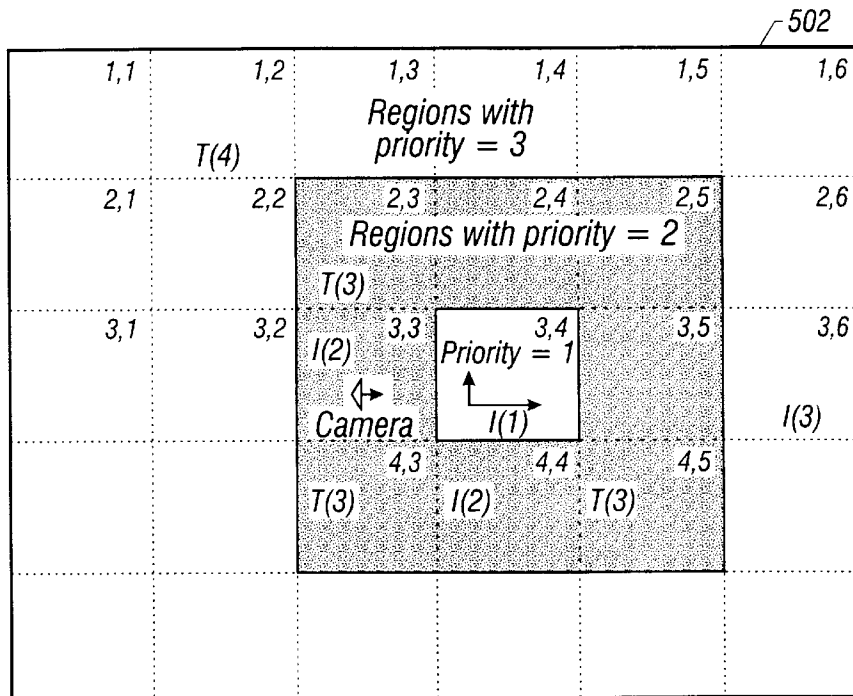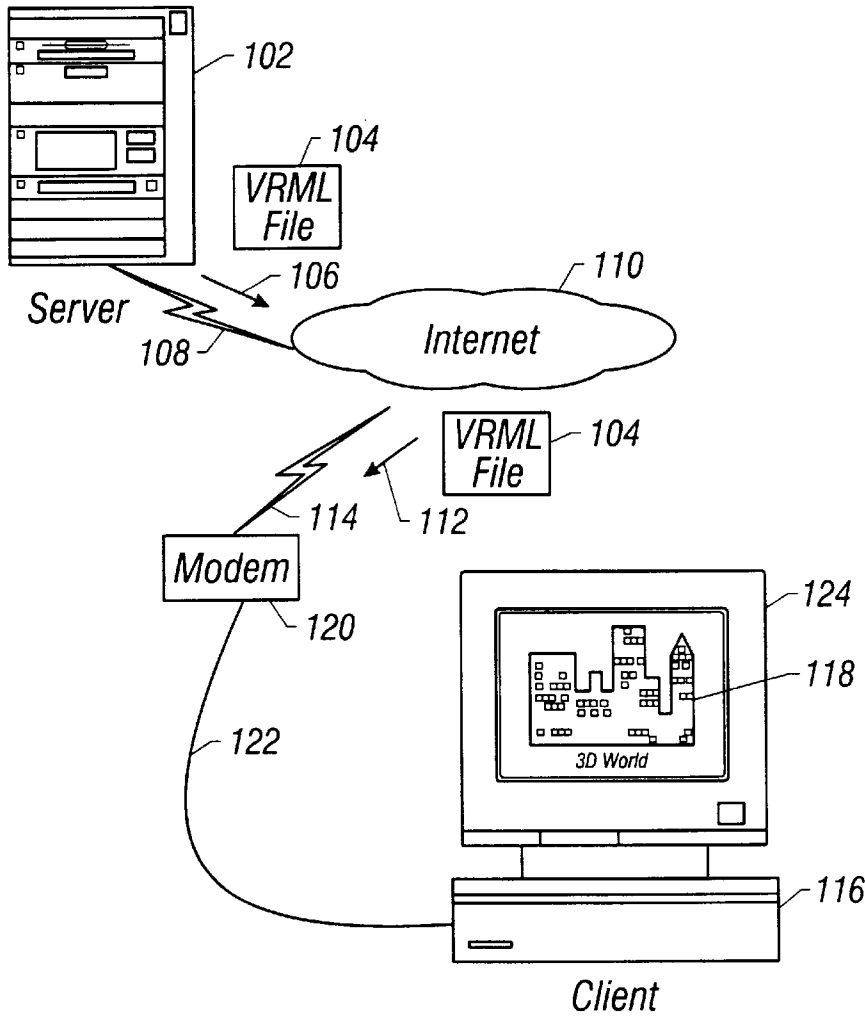
FIG. 1
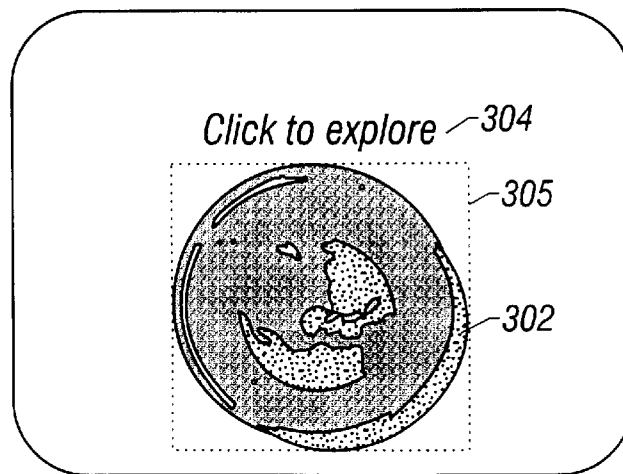
FIG. 3

```
#VRML V2.0                                              — 202
Group { children [                                      — 204
    Inline {                                            — 206
                          url "earth.wrl"               — 208
        bboxSize      2 2 2                             — 210
        bboxCenter   0 0 0                              — 212
    },                                                  — 214
    Anchor {                                            — 216
      url "http://www.globe.com"                        — 218
      description "Globe home page"                     — 220
      children [                                        — 222
        Transform {                                     — 224
        translation 0 1.25 0                            — 226
        scale 0.025 0.025 0.025                         — 228
          children [                                    — 230
            Shape {                                     — 232
            appearance Appearance {                     — 234
                material Material {                     — 236
                    diffuseColor   1 0 0                — 238
                }                                       — 240
            }                                           — 242
            geometry                                    — 244
            Text {                                      — 246
                fontStyle Fontstyle {                   — 248
                    size 10                             — 250
                    justify "MIDDLE"                    — 252
                }                                       — 254
                string "Click to explore"              — 256
            }                                           — 258
            }                                           — 260
        [                                               — 262
        }                                               — 264
    [                                                   — 266
    }                                                   — 268
[                                                       — 270
}                                                       — 272
```
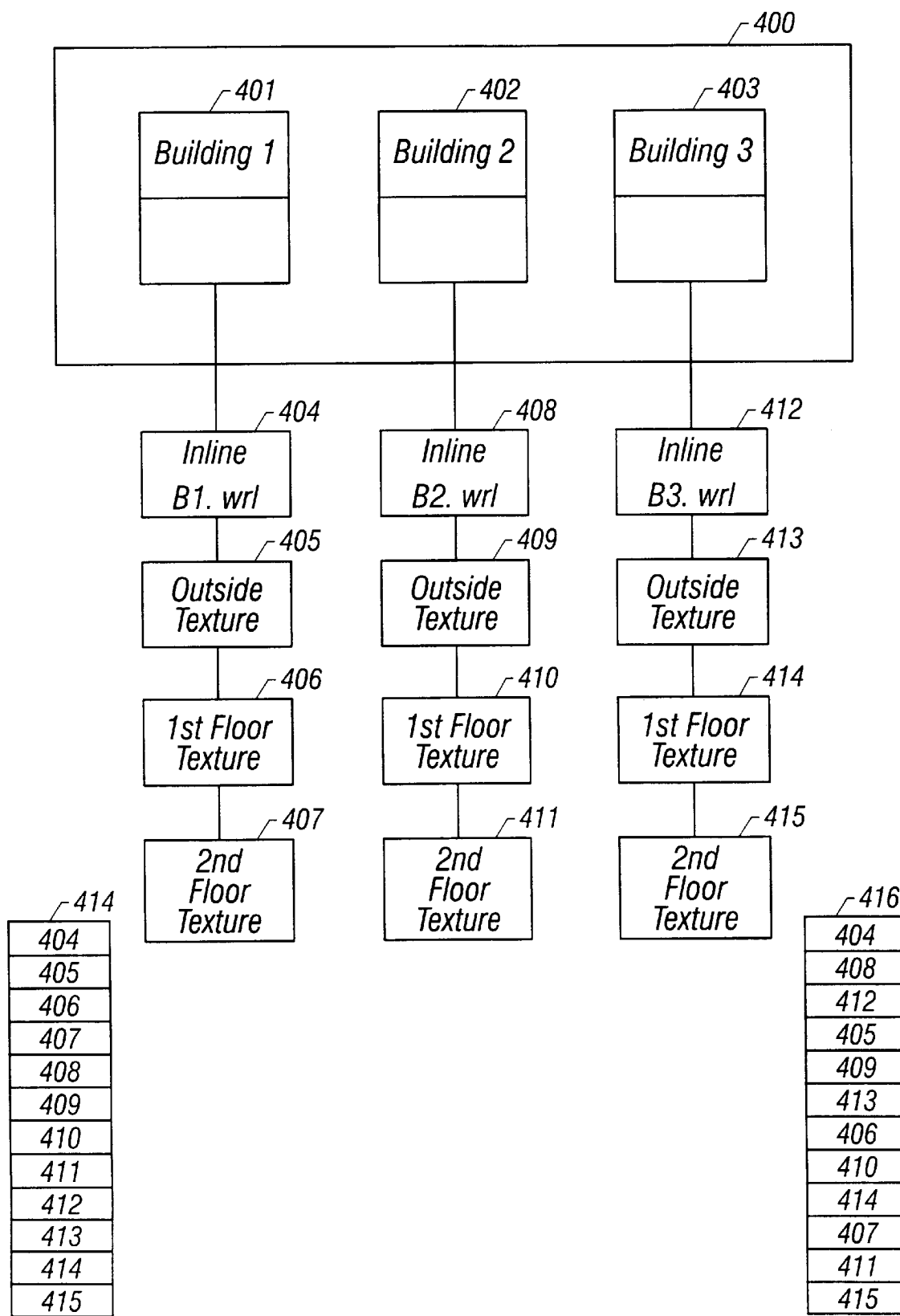
FIG. 2

FIG. 4

FIG. 5A

FIG. 5B

DOCKET ALARM
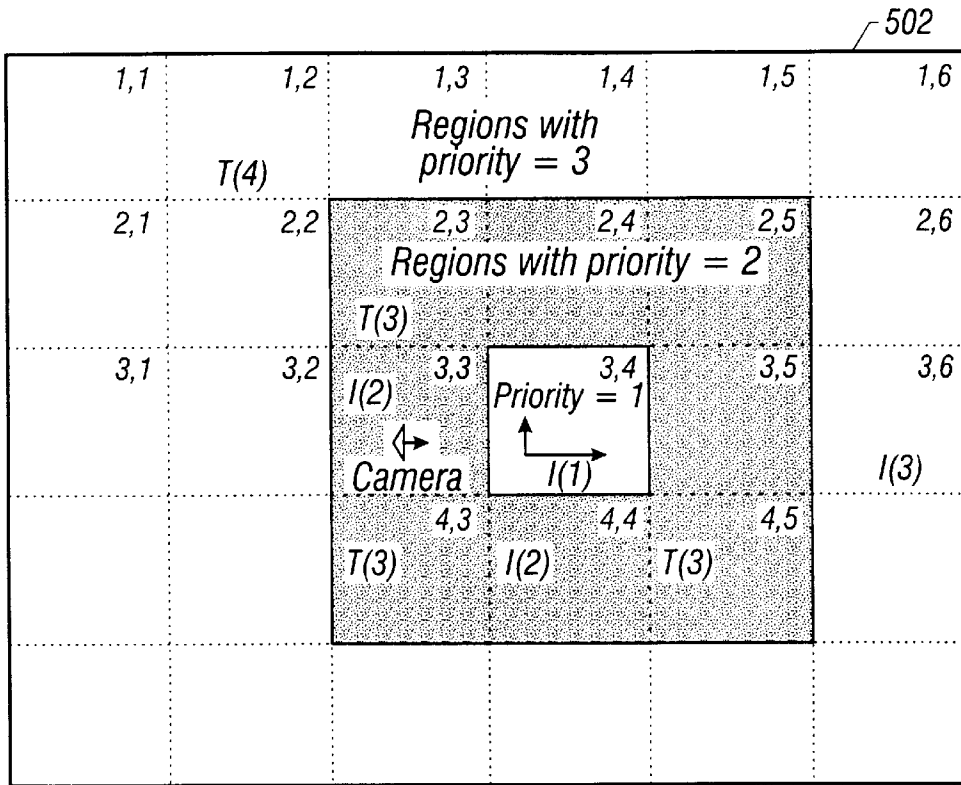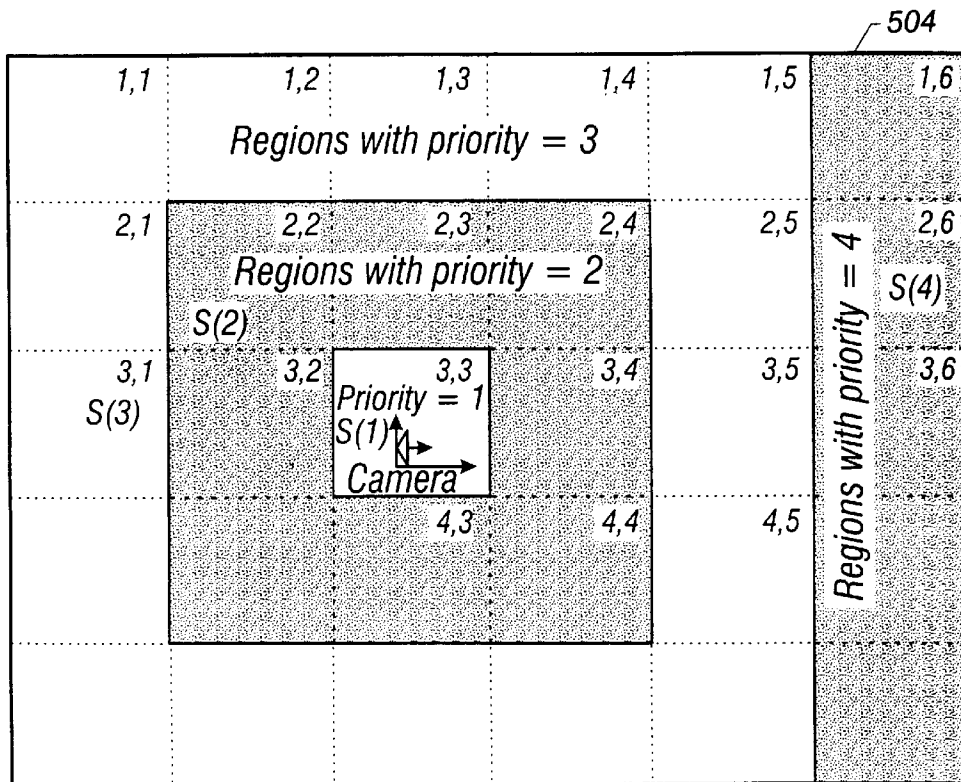
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