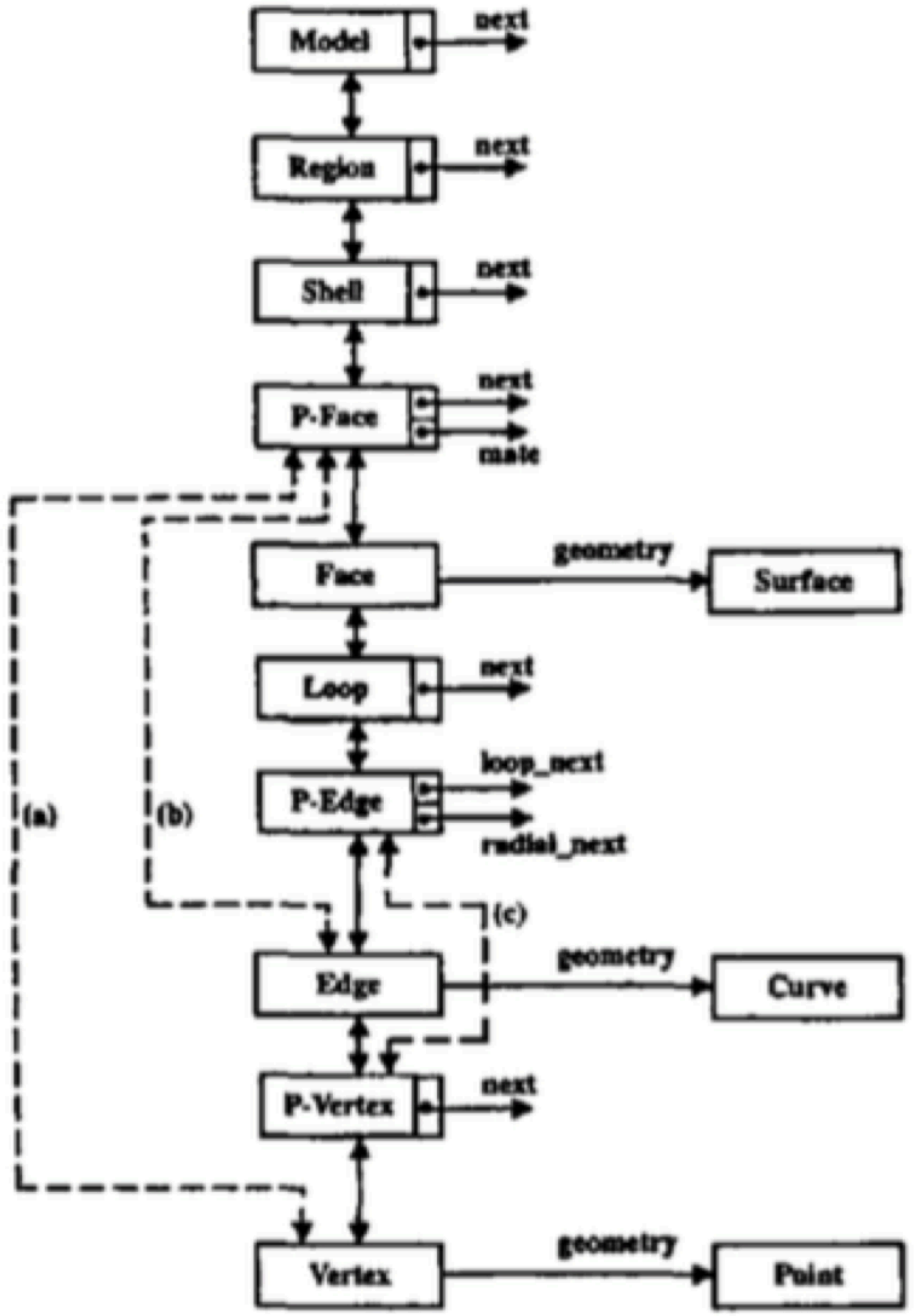
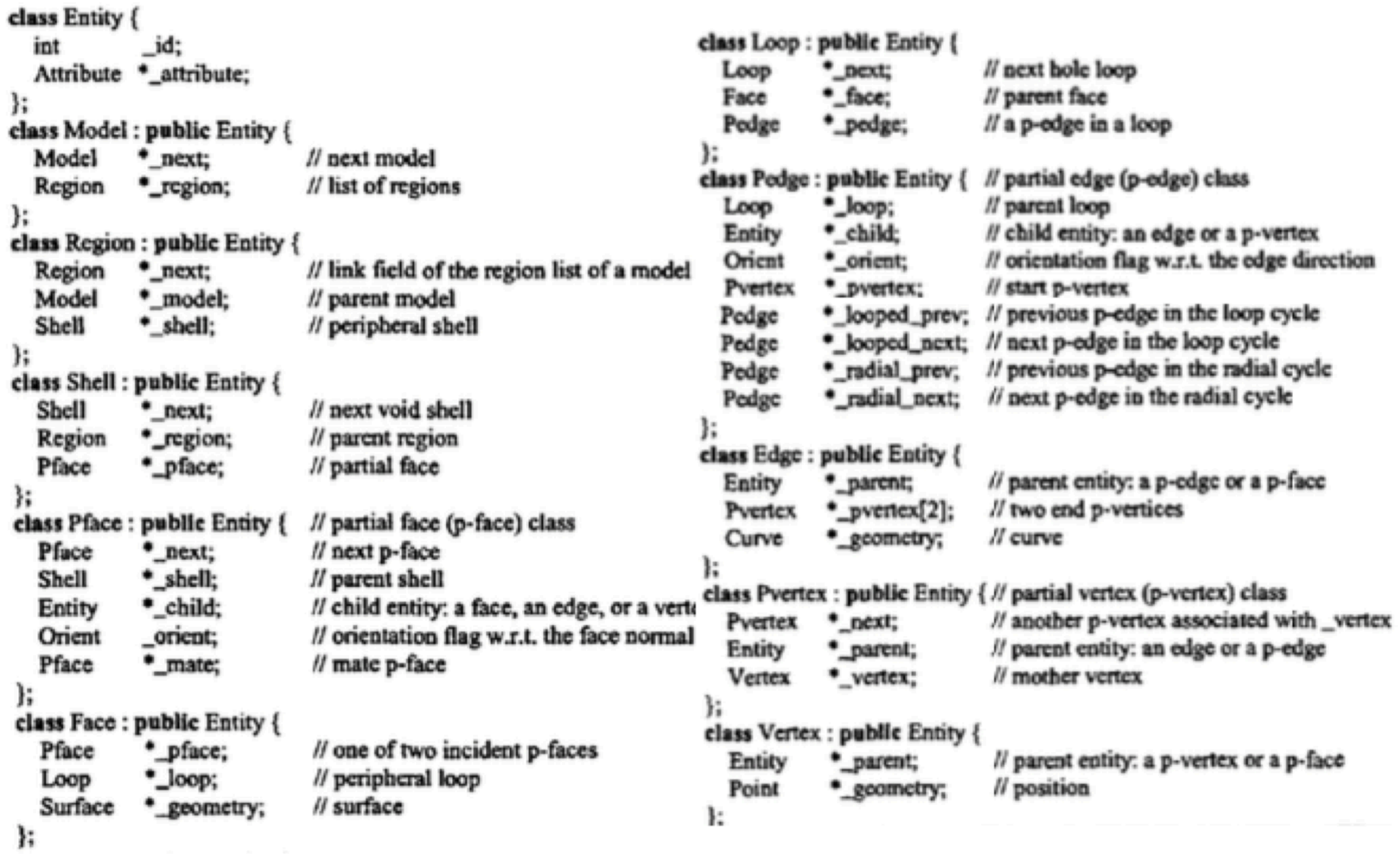
Compact Non-Manifold Boundary Representation Based on Partial Topological Entities





```
class Entity {
    int          _id;
    Attribute    *_attribute;
};
class Model : public Entity {
    Model        *_next;          // next model
    Region       *_region;        // list of regions
};
class Region : public Entity {
    Region       *_next;          // link field of the region list of a model
    Model        *_model;         // parent model
    Shell        *_shell;         // peripheral shell
};
class Shell : public Entity {
    Shell        *_next;          // next void shell
    Region       *_region;        // parent region
    Pface        *_pface;         // partial face
};
class Pface : public Entity {     // partial face (p-face) class
    Pface        *_next;          // next p-face
    Shell        *_shell;         // parent shell
    Entity       *_child;         // child entity: a face, an edge, or a vert
    Orient       _orient;         // orientation flag w.r.t. the face normal
    Pface        *_mate;          // mate p-face
};
class Face : public Entity {
    Pface        *_pface;         // one of two incident p-faces
    Loop         *_loop;          // peripheral loop
    Surface      *_geometry;      // surface
};
```

```
class Loop : public Entity {
    Loop       *_next;           // next hole loop
    Face       *_face;           // parent face
    Pedge      *_pedge;          // a p-edge in a loop
};
class Pedge : public Entity {    // partial edge (p-edge) class
    Loop       *_loop;           // parent loop
    Entity     *_child;          // child entity: an edge or a p-vertex
    Orient     *_orient;         // orientation flag w.r.t. the edge direction
    Pvertex    *_pvertex;        // start p-vertex
    Pedge      *_looped_prev;    // previous p-edge in the loop cycle
    Pedge      *_looped_next;    // next p-edge in the loop cycle
    Pedge      *_radial_prev;    // previous p-edge in the radial cycle
    Pedge      *_radial_next;    // next p-edge in the radial cycle
};
class Edge : public Entity {
    Entity     *_parent;         // parent entity: a p-edge or a p-face
    Pvertex    *_pvertex[2];     // two end p-vertices
    Curve      *_geometry;       // curve
};
class Pvertex : public Entity {  // partial vertex (p-vertex) class
    Pvertex    *_next;           // another p-vertex associated with _vertex
    Entity     *_parent;         // parent entity: an edge or a p-edge
    Vertex     *_vertex;         // mother vertex
};
class Vertex : public Entity {
    Entity     *_parent;         // parent entity: a p-vertex or a p-face
    Point      *_geometry;       // position
};
```