OOP DESIGN WITH GAME

레이어 분리

Layering

먼저 크게 분리한다.

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client ⟷ server

presentation⟷domain⟷data source

Layering

먼저 크게 분리한다.

client ⟷ server

presentation↔domain↔data source

레이어는 계층적이다.
기저레이어는 추상레이어를 모른다.
레이어 안에 다수의 역할이 소속된다.

기저레이어


기저레이어
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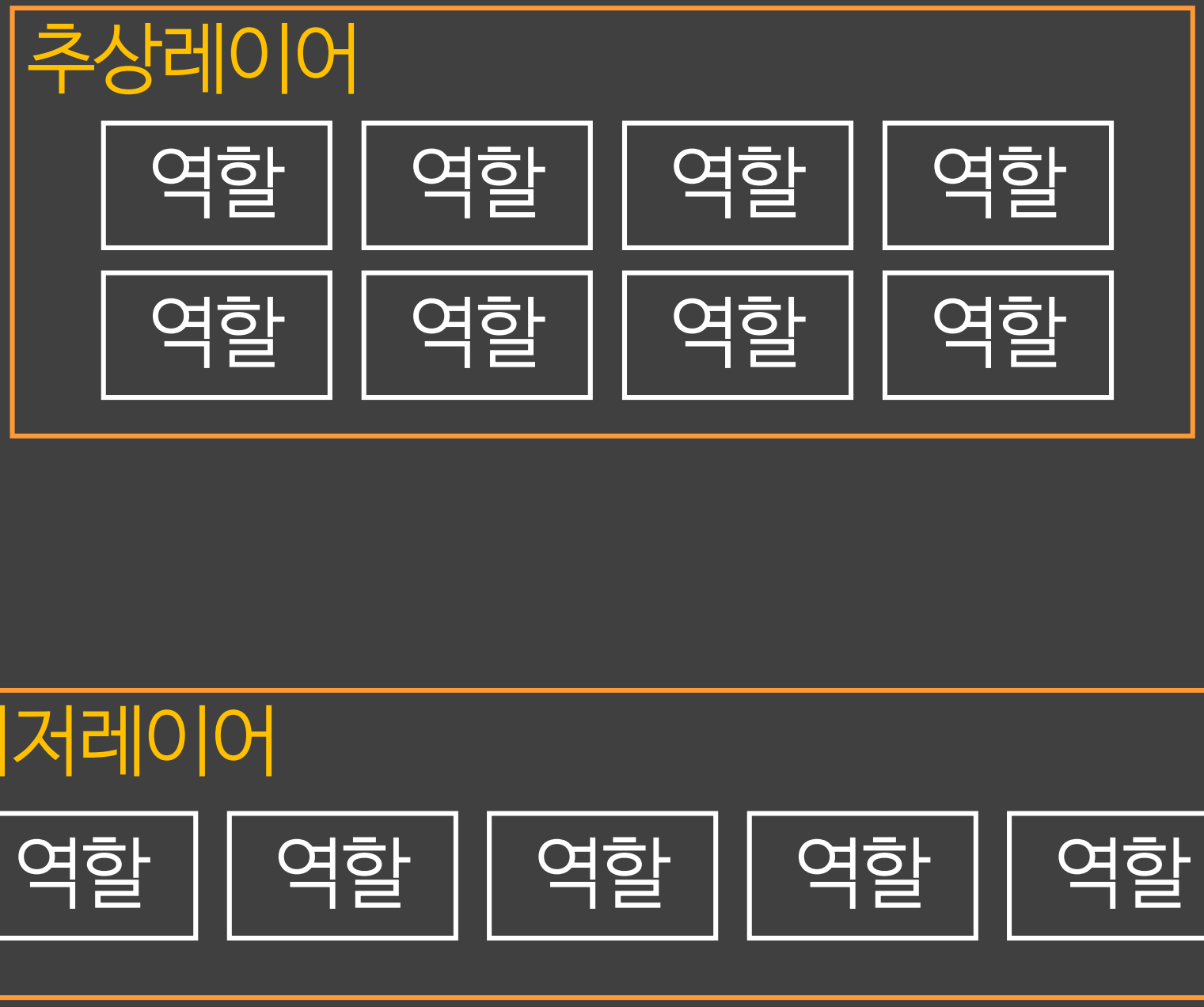
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역할
역할
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역할
스텁
스켈레톤
RPC, REST,
web service
기저레이어
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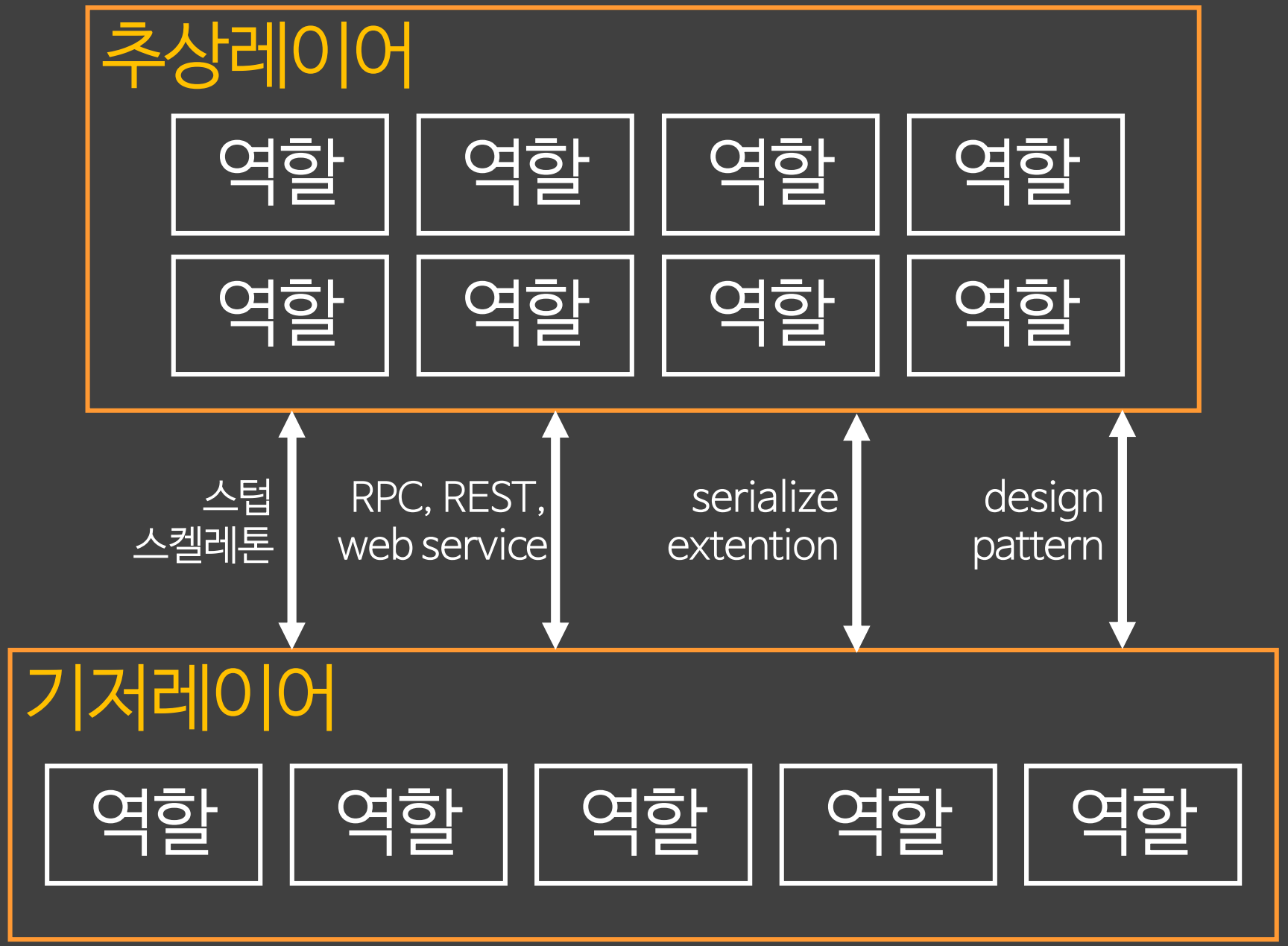
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스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
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역할
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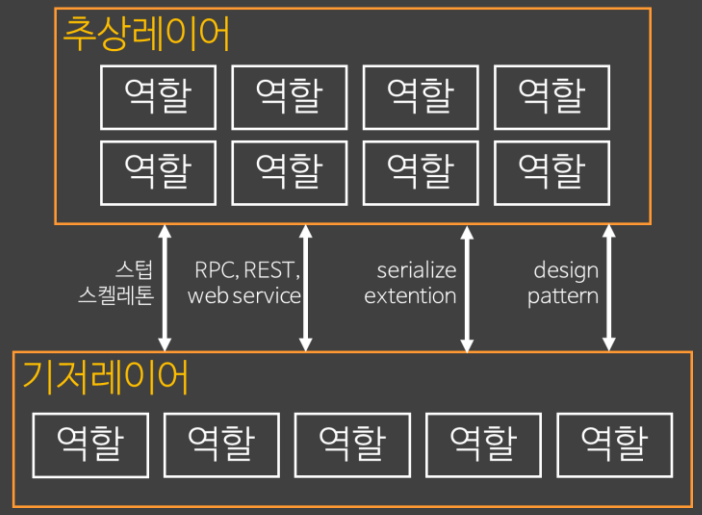
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스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
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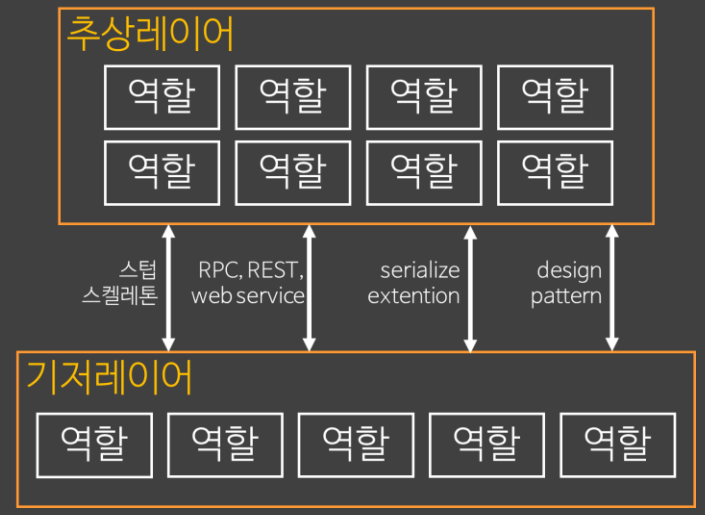
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스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
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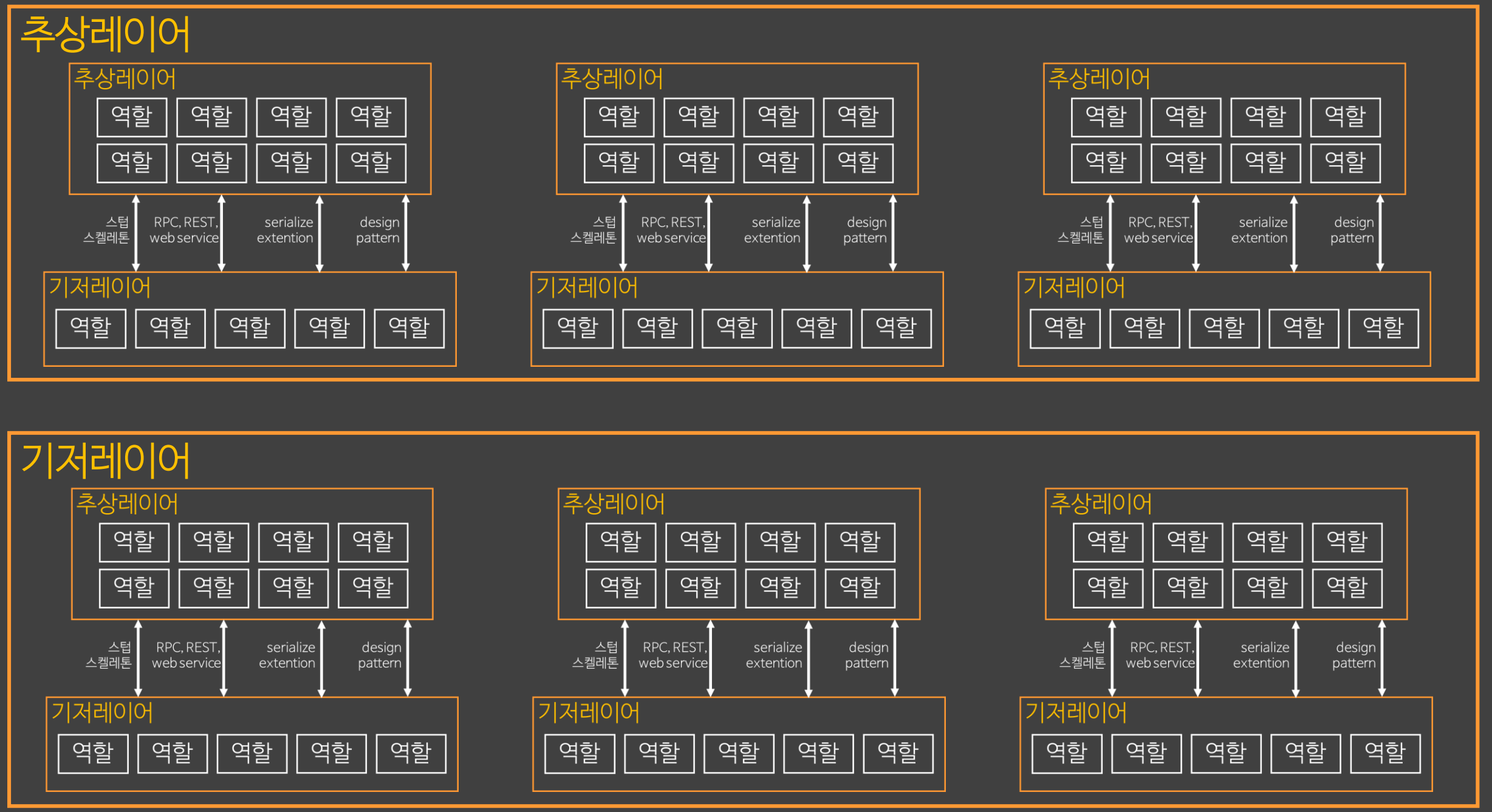
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역할
스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
역할
역할
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추상레이어
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스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
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스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
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스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
역할
역할
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추상레이어
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스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
역할
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추상레이어
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역할
스텁
스켈레톤
RPC, REST,
web service
serialize
extention
design
pattern
기저레이어
역할
역할
역할
역할
역할


추상레이어
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역할
스텁 스켈레톤
RPC, REST, web service
serialize extention
design pattern
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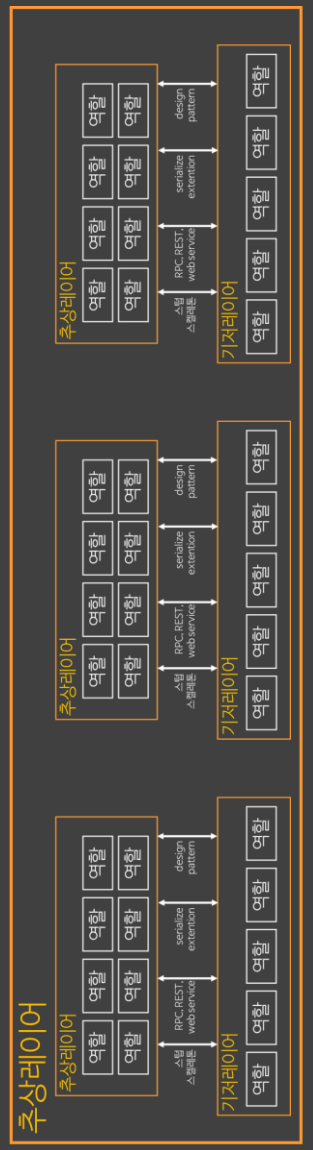
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역할
design pattern
serialize extention
RPC, REST, web service
스텁 스켈레톤
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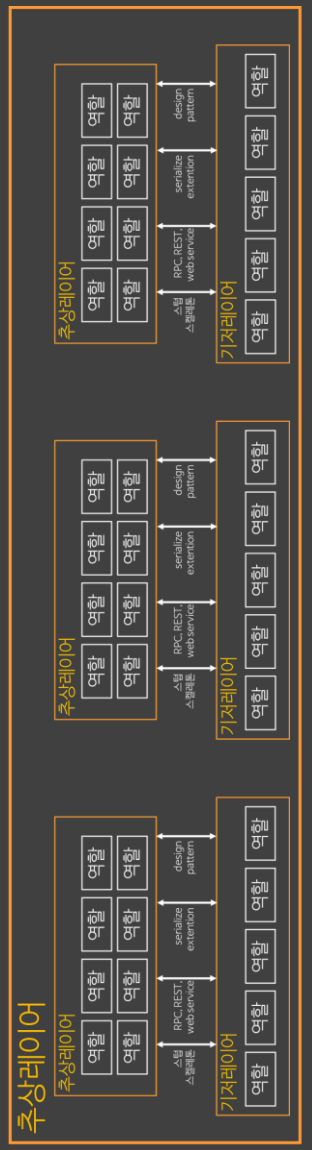
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역할
design pattern
serialize extention
RPC, REST, web service
스텁 스켈레톤
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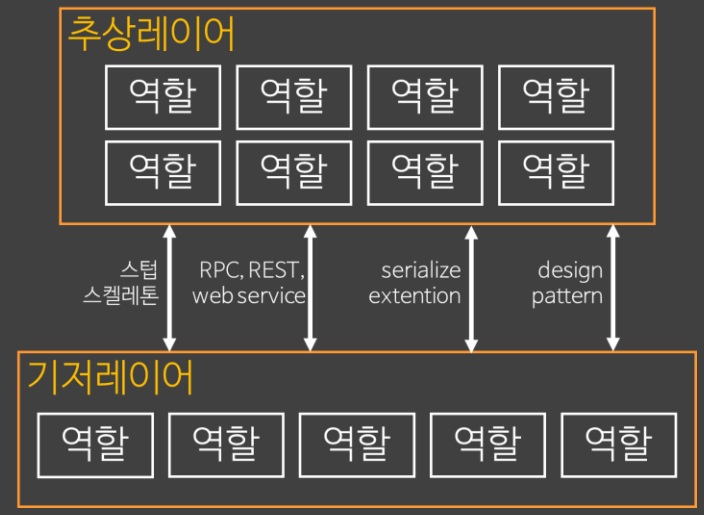
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역할
스텁 스켈레톤
RPC, REST, web service
serialize extention
design pattern
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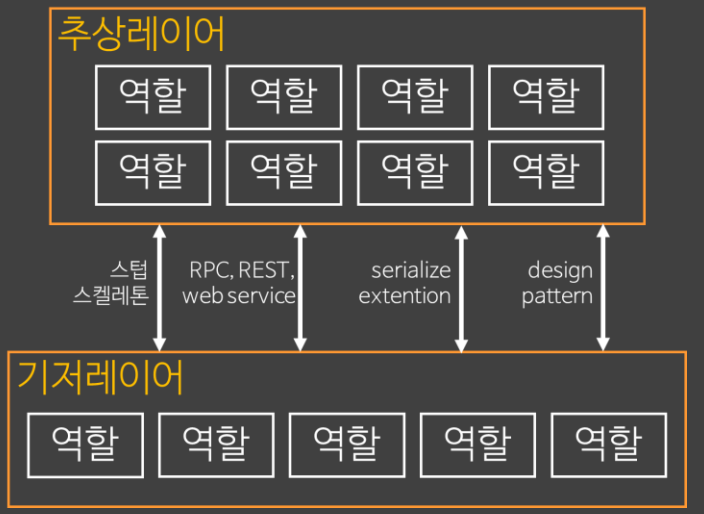
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역할
스텁 스켈레톤
RPC, REST, web service
serialize extention
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유틸리티

베이스클래스

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함수제공

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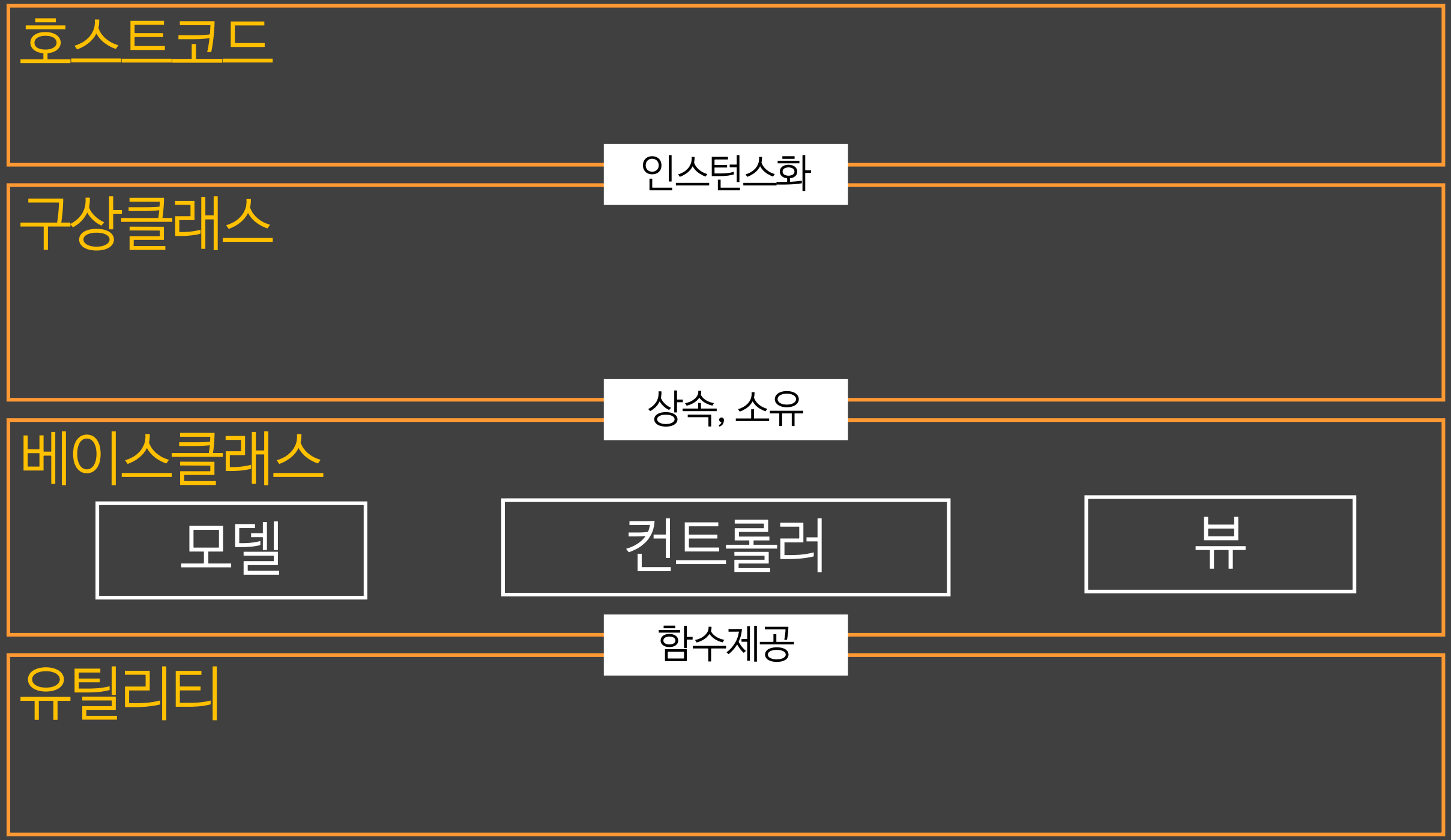
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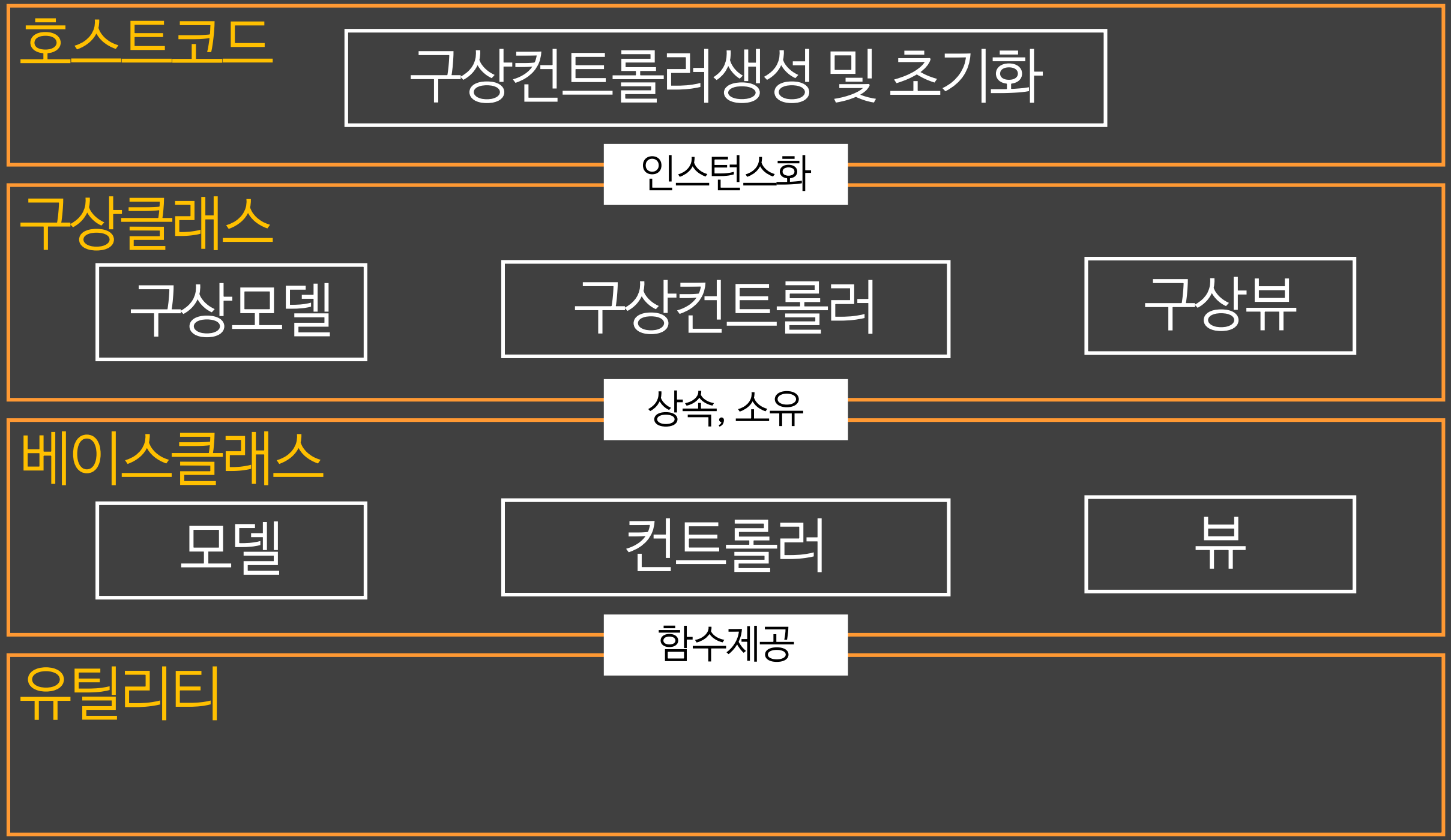
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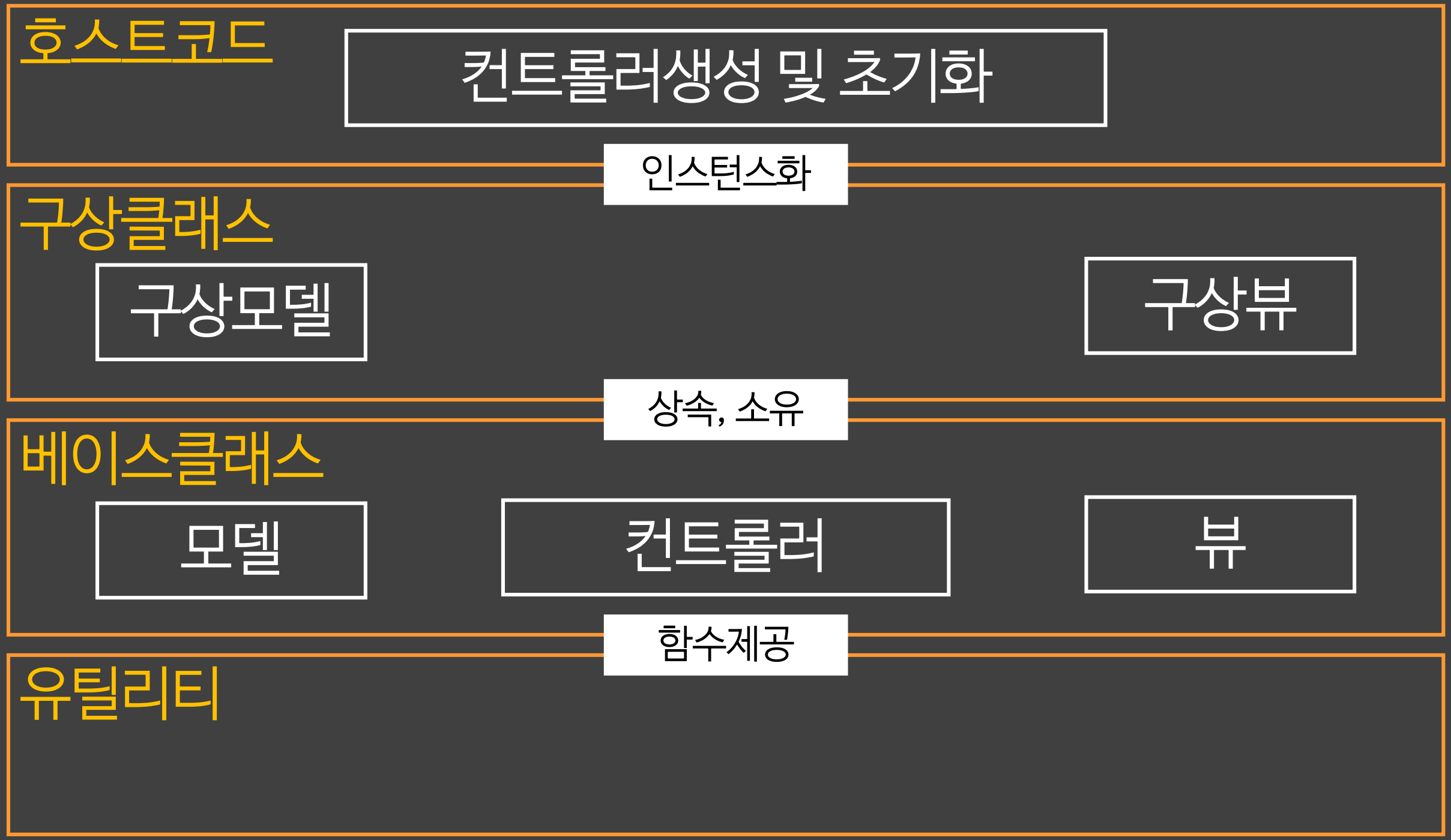
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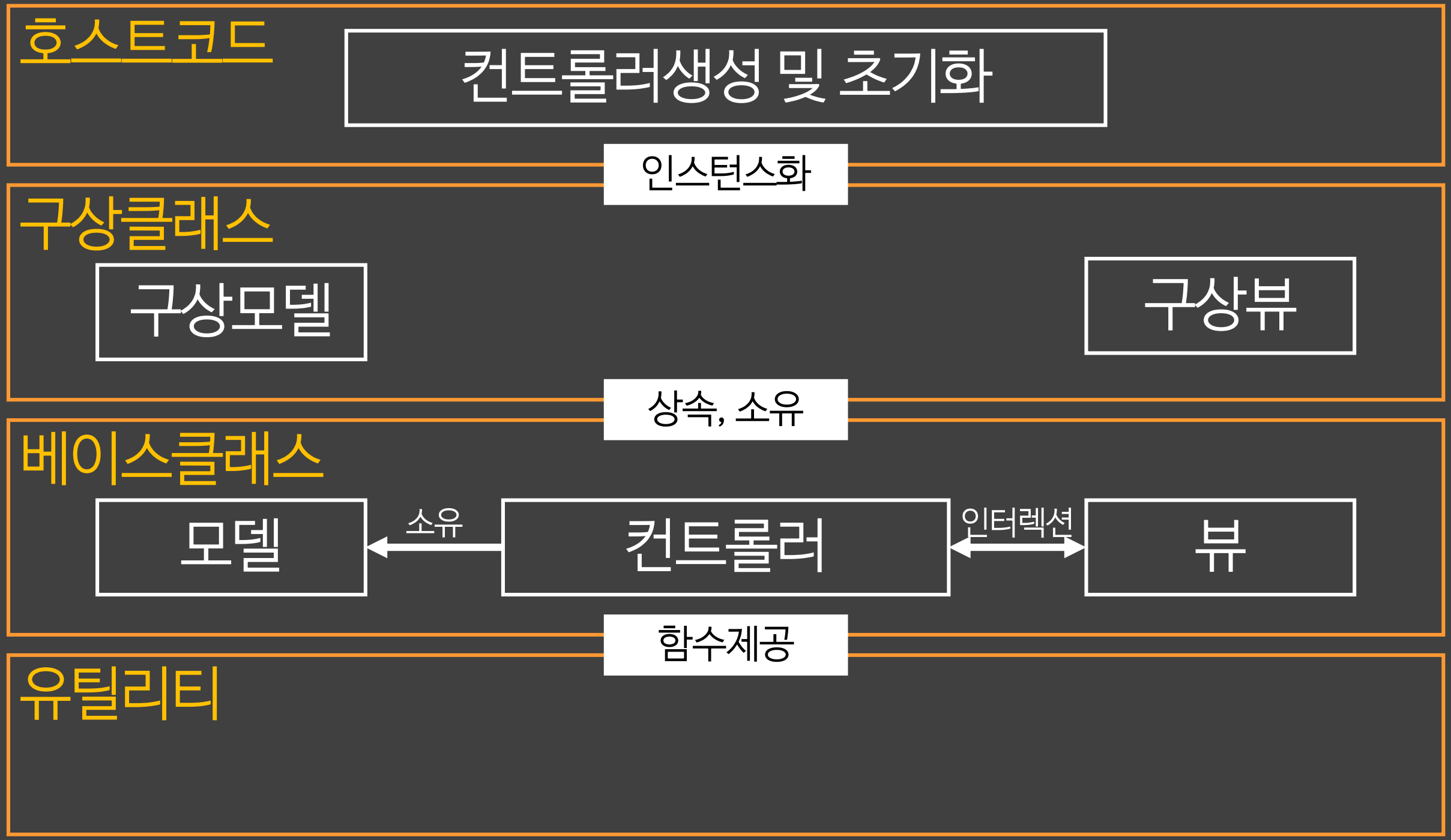
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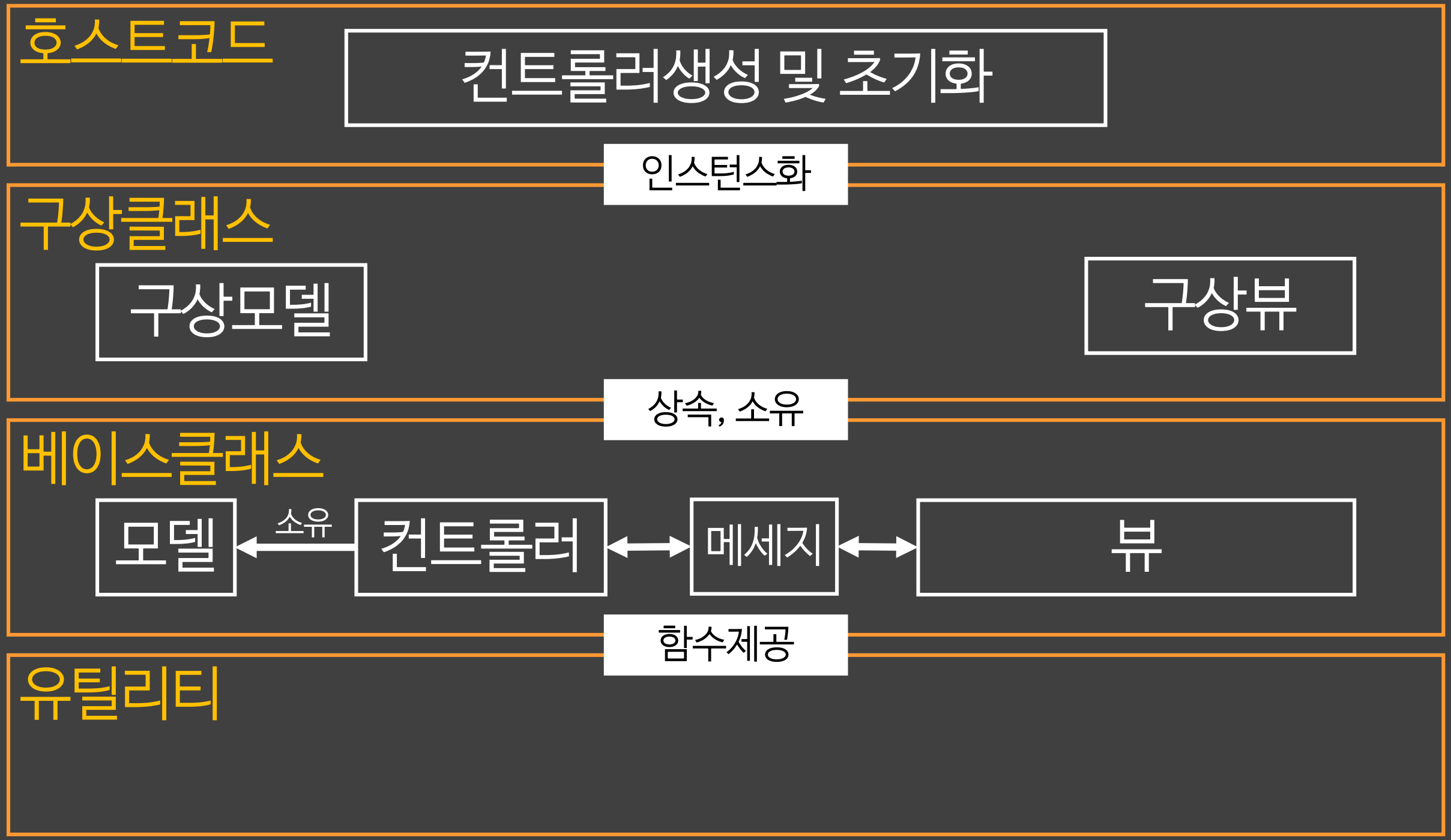
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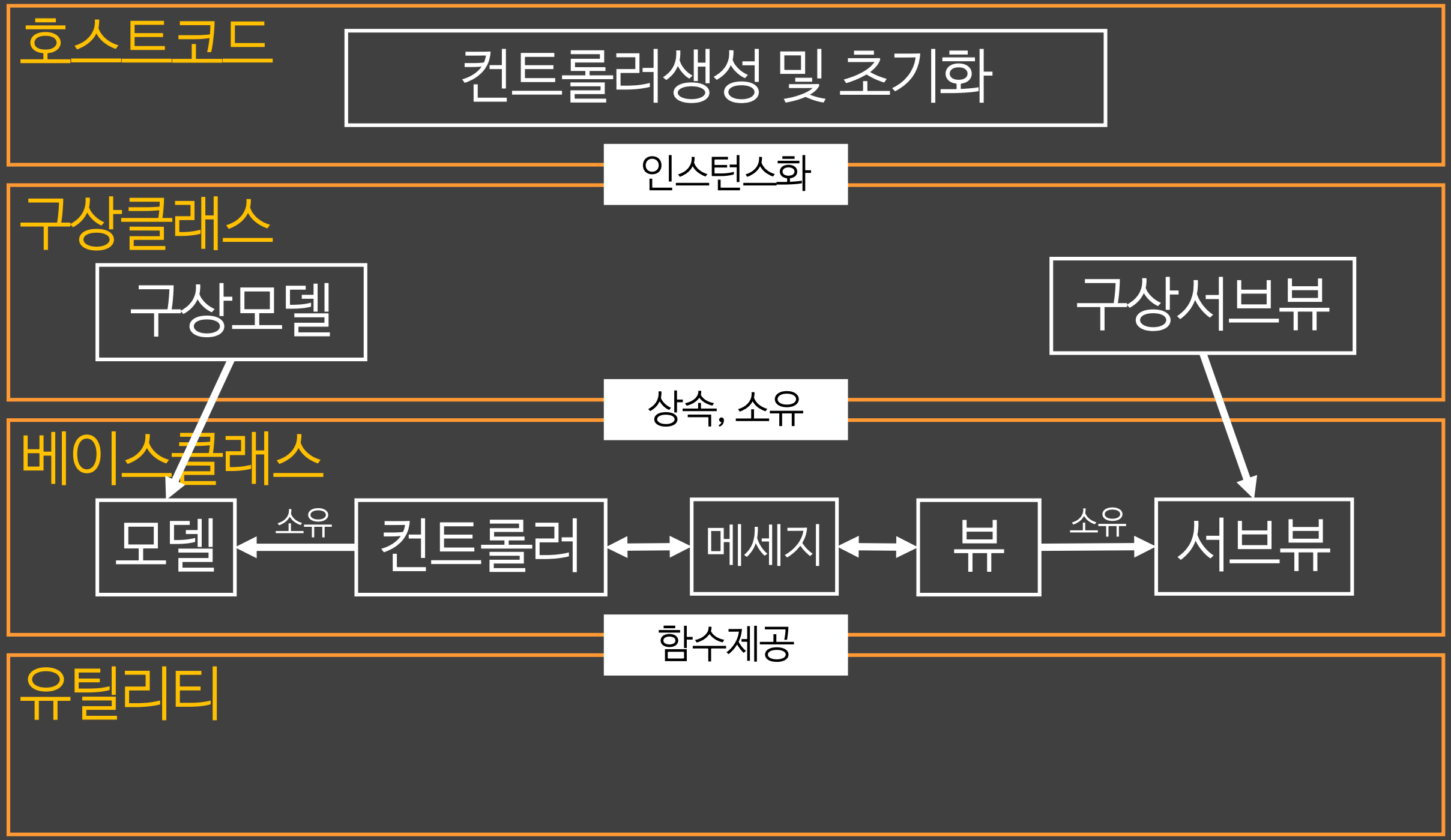
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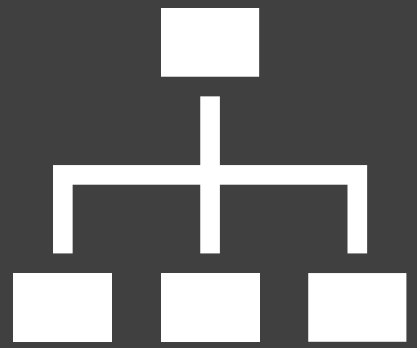

```
const Block = class{
  static GET(type = parseInt(Math.random() * 5)){return new Block(type);}
  constructor(type){
    this._type = type;
  }
  get image(){return `url('img/block${this._type}.png')`;}
  get type(){return this._type;}
}
```

```
const data = [];
```

```
const data = [];
```

```
return tid=>{
  table = document.querySelector(tid);
  for(let i = 0; i < row; i++){
    const r = [];
    data.push(r);
    for(let j = 0; j < column; j++) r[j] = Block.GET();
  }
  table.addEventListener('mousedown', down);
  table.addEventListener('mouseup', up);
  table.addEventListener('mouseleave', up);
  table.addEventListener('mousemove', move);
  render();
};
```

```
const selected = [];
```

```
const selected = [];
```

```
const down = ({pageX:x, pageY:y})⇒{
  if(isDown) return;
  const curr = getBlock(x, y);
  if(!curr) return;
  isDown = true;
  selected.length = 0;
  selected[0] = startBlock = currBlock = curr;
  render();
};
const move =({pageX:x, pageY:y})⇒{
  if(!isDown) return;
  const curr = getBlock(x, y);
  if(!curr || curr.type ≠ startBlock.type || !isNext(curr)) return;
  if(selected.indexOf(curr) == -1) selected.push(curr);
  else if(selected[selected.length - 2] == curr) selected.pop();
  currBlock = curr;
  render();
};
const up =_⇒selected.length > 2 ? remove() : reset();
```

```
const Item = class{
   static GET(type, x, y){return new Item(type, x, y);}
   constructor(_type, _x, _y){
      prop(this, {_type, _x, _y, _selected:false, _prev:null});
   }
```

Util layer

```
const UTIL = {
  el:v=>document.querySelector(v),
  prop:(...arg)=>Object.assign(...arg)
};
```

```
const Item = class{
   static GET(type, x, y){ return new Item(type, x, y); }
   constructor(_type, _x, _y){
      prop(this, {_type, _x, _y, _selected:false, _prev:null});
   }
   get type(){return this._type;}
   get x(){return this._x;}
   get y(){return this._y;}
   get selected(){return this._selected;}
   get prev(){return this._prev;}
```

```
const Item = class{
   static GET(type, x, y){ return new Item(type, x, y); }
   constructor(_type, _x, _y){
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   }
   get type(){return this._type;}
   get x(){return this._x;}
   get y(){return this._y;}
   get selected(){return this._selected;}
   get prev(){return this._prev;}
   pos(x, y){
      this._x = x;
      this._y = y;
   }
   select(item){
      this._selected = true;
      this._prev = item;
   }
   unselect(){
      this._selected = false;
      this._prev = null;
   }
```

```
const Item = class{
   static GET(type, x, y){ return new Item(type, x, y); }
   constructor(_type, _x, _y){
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   get y(){return this._y;}
   get selected(){return this._selected;}
   get prev(){return this._prev;}
   pos(x, y){
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      this._y = y;
   }
   select(item){
      this._selected = true;
      this._prev = item;
   }
   unselect(){
      this._selected = false;
      this._prev = null;
   }
                              isSelectedList(item){
                                 if(!this._prev) return false;
                                 if(this._prev === item) return true;
                                 else return this._prev.isSelectedList(item);
                              }
                              isBorder(item){
                                 return Math.abs(this.x - item.x) < 2 && Math.abs(this.y - item.y) < 2;
                              }
                           }
```

컨트롤러

```
const Game = class{
   constructor(setting){
      prop(this, setting, {
         items:new Set,
         msg2item:new WeakMap,
         item2msg:new WeakMap
      });
```

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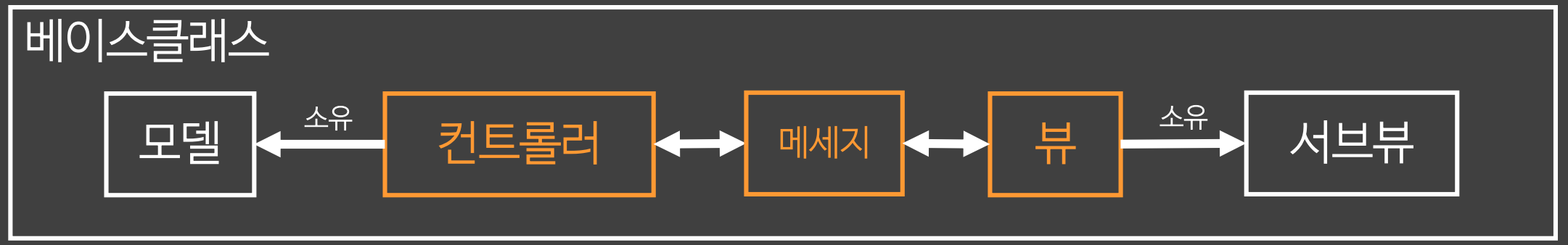
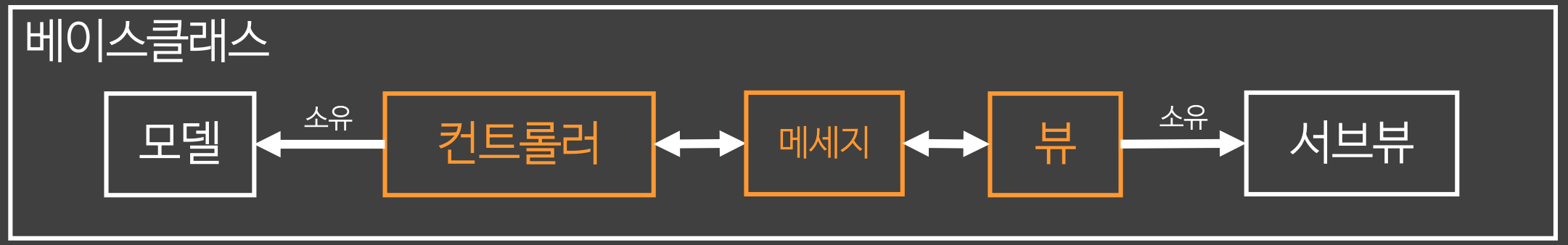


```
const Game = class{
    constructor(setting){
        prop(this, setting, {
            items:new Set,
            msg2item:new WeakMap,
            item2msg:new WeakMap
        });
        const {renderer, row, column, items, item2msg} = this;
        renderer.setGame(this, row, column);
        for(let c = 0; c < column; c++){
            for(let r = 0; r < row; r++) this._add(c, r);
        }
```



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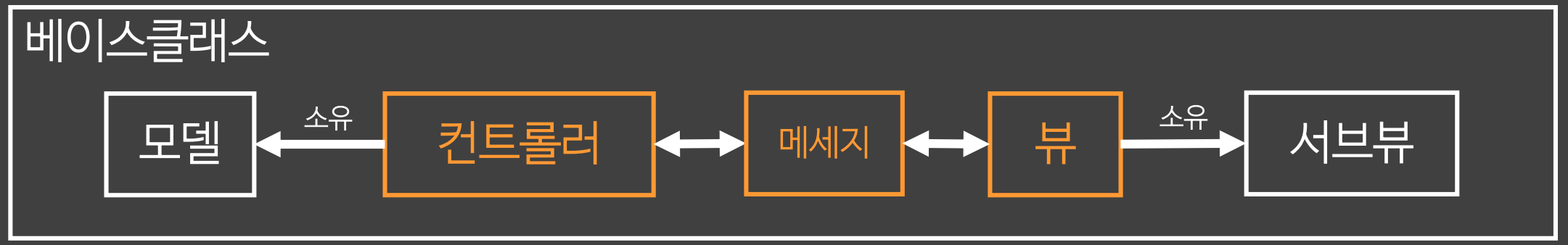
        renderer.setGame(this, row, column);
        for(let c = 0; c < column; c++){
            for(let r = 0; r < row; r++) this._add(c, r);
        }
        Promise.all(items.map(item=>{
            item.pos(item.x, item.y + row);
            return renderer.move(item2msg.get(item).pos(item.x, item.y)));
        })).then(_=>renderer.activate())
    }
```



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      });
      ...
   }
   _add(c, r){
      const {itemType, row, items, msg2item, item2msg, renderer} = this;
      const item = new Item(itemType[parseInt(Math.random() * itemType.length)], c, r - row);
      const msg = new GameMsg;
      items.add(item);
      msg2item.set(msg, item);
      item2msg.set(item, msg);
      renderer.add(msg);
      return item;
   }
   _delete(item){
      const msg = this.item2msg.get(item);
      this.msg2item.delete(msg);
      this.item2msg.delete(item);
      this.items.delete(item);
   }
```

```
const Game = class{
   ...
   getInfo(msg){
      const item = this.msg2item.get(msg);
      msg.info(item.x, item.y, item.type, item.selected);
      return msg;
   }
```

getInfo(msg)

```
const Game = class{
   constructor(setting){
      prop(this, setting, {
         items:new Set,
         msg2item:new WeakMap,
         item2msg:new WeakMap,
         prevItem:null
      });
      ...
   }
   selectStart(msg){
      const item = this.msg2item.get(msg);
      if(!item) return;
      item.select();
      this.prevItem = item;
   }
```

```
getInfo(msg)
selectStart(msg)
```

```
const Game = class{
   ...
   selectStart(msg){
      const item = this.msg2item.get(msg);
      if(!item) return;
      item.select();
      this.prevItem = item;
   }
   selectNext(msg){
      const item = this.msg2item.get(msg);
      if(!item) return;
      const {prevItem:curr} = this;
      //자신이 아니고 타입이 같아야하며, 인접셀이어야 함
      if(item == curr || item.type != curr.type || !curr.isBorder(item)) return;
      if(!curr.isSelectedList(item)){ //선택된 게 아니면 add
         item.select(curr);
         this.prevItem = item;
      }else{ //선택된 것 중에서 직전 것이면 release
         if(curr.prev === item){
            this.prevItem = curr.prev;
            curr.unselect();
         }
      }
   }
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
```

```
const Game = class{


   ...

   selectEnd(){
      const {items, item2msg, renderer} = this;
      const selected = [];
      items.forEach(v=>v.selected && selected.push(item2msg.get(v)));
      if(selected.length > 2) renderer.remove(selected).then(_=>this._clear());
      else items.forEach(v=>v.unselect());
      this.prevItem = null;
   }
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
selectEnd()
```

```
const Game = class{
   ...
    _clear(selectedItems){}
   _dropBlocks(){}
   _fillStart(){}
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
selectEnd()
_clear(selectedItems)
_dropBlocks()
_fillStart()
```

```
const Game = class{
   ...
   _clear(selectedItem){
      const {items, renderer} = this;
      renderer.deactivate();
      items.forEach(item=>item.selected && this._delete(item));
      this._dropBlocks();
   }
   _dropBlocks(){}
   _fillStart(){}
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
selectEnd()
_clear(selectedItems)
_dropBlocks()
_fillStart()
```

```
const Game = class{
   _dropBlocks(){
      const {items, column, row, renderer, item2msg} = this;
      const allItems = [];
      for(let i = row; i--;) allItems.push([]);
      items.forEach(item=>(allItems[item.y][item.x] = item));
      const coll = [];
      for(let c = 0; c < column; c++){
         for(let r = row - 1; r > -1; r--){
            if(allItems[r] && allItems[r][c]){
               let cnt = 0;
               for(let j = r + 1; j < row; j++){
                  if(allItems[j] && ! allItems[j][c]) cnt++;
               }
               if(cnt){
                  const item = allItems[r][c];
                  item.pos(c, r + cnt);
                  coll.push(renderer.move(item2msg.get(item).pos(item.x, item.y)));
               }
            }
         }
      }
      if(coll.length) Promise.all(coll).then(_=>this._fillStart());
   }
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
selectEnd()
_clear(selectedItems)
_dropBlocks()
_fillStart()
```

```
const Game = class{
   _fillStart(){
      const {items, column, row, renderer, item2msg} = this;
      const allItems = [];
      for(let i = row; i--;) allItems.push([]);
      items.forEach(item=>(allItems[item.y][item.x] = item));
      const coll = [];
      for(let c = 0; c < column; c++){
         for(let r = row - 1; r > -1; r--){
            if(allItems[r] && ! allItems[r][c]) coll.push(this._add(c, r));
         }
      }
      if(!coll.length) return;
      Promise.all(coll.map (item=>{
         item.pos(item.x, item.y + row);
         return renderer.move(item2msg.get(item).pos(item.x, item.y));
      }).then(_=>renderer.activate())
   }
```

```
getInfo(msg)
selectStart(msg)
selectNext(msg)
selectEnd()
_clear(selectedItems)
_dropBlocks()
_fillStart()
```

서브렌더러

```
const ItemRenderer = class{
   get object(){throw 'override';}
   find(v){throw 'override';}
   remove(){return this._remove();}
   move(x, y){return this._move(x, y);}
   render(x, y, type, selected){ this._render(x, y, type, selected);}
   _remove(){throw 'override';}
   _move(x, y){throw 'override';}
   _render(x, y, type, selected){throw 'override';}
};
```

렌더러

Util layer

```
const UTIL = {
  el:v=>document.querySelector(v),
  prop:(...arg)=>Object.assign(...arg),
  ThrowSet:class extends Set{
   constructor(){
      super();
   }
   some(f){
      try{
         this.forEach((v, i)=>{
            if(v = f(v,i)) throw v;
         });
      }catch(r){
         return r;
      }
   }
  }
};
```

```
const Renderer = class extends ThrowSet{
   constructor(itemFactory){
      super();
      prop(this, {_itemFactory:itemFactory, msg2item:new WeakMap, item2msg:new WeakMap});
   }
   setGame(_game, _row, _col){ prop(this, {_game, _row, _col}); }
   activate(){throw 'override!';}
   deactivate(){throw 'override!';}
```

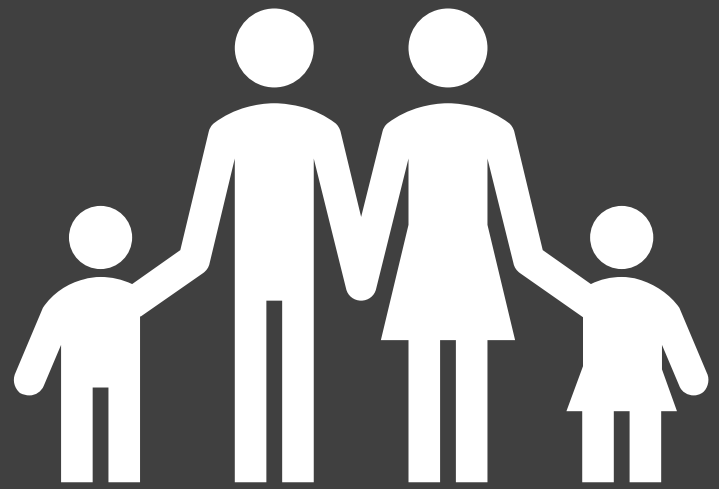
```
const Renderer = class extends ThrowSet{
   add(msg){
      const {msg2item, item2msg, _itemFactory} = this;
      const item = _itemFactory(this, this.bw, this.bh, this.img);
      super.add(item);
      msg2item.set(msg, item);
      item2msg.set(item, msg);
      this._add(item);
   }
   _add(v){throw 'override'}
```

```
const Renderer = class extends ThrowSet{
   remove(msgs){
      if(!msgs.length) return;
      const {msg2item} = this;
      return Promise.all(msgs.map(msg=>{
         const item = msg2item.get(msg);
         msg2item.delete(msg);
         this._delete(item);
         return item.remove();
      }));
   }
   _delete(item){
      this.item2msg.delete(item);
      super.delete(item);
      this._remove(item);
   }
   _remove(item){throw 'override!';}
   move(msg){
      const {x, y} = msg.pos();
      return this.msg2item.get(msg).move(x, y);
   }
```

```
const Renderer = class extends ThrowSet{
   itemStart(item){ this._gameRequest(this._game.selectStart, item); }
   itemNext(item){ this._gameRequest(this._game.selectNext, item); }
   itemEnd(){ this._gameRequest(this._game.selectEnd); }
   _gameRequest(f, item){
      const {_game:game, item2msg} = this;
      if(item) f.call(game, item2msg.get(item));
      else f.call(game);
   }
```

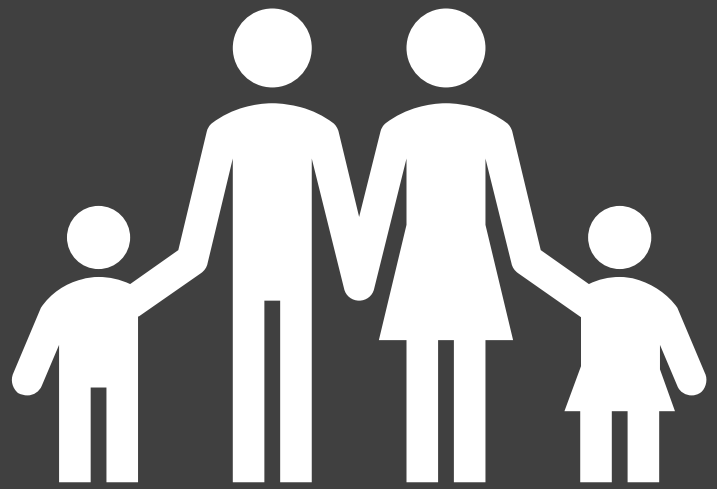
```
const Renderer = class extends ThrowSet{
   _renderLoop(){
      const {_game:game, item2msg} = this;
      this.forEach(item=>{
         const {x, y, type, selected} = game.getInfo(item2msg.get(v)).info();
         item.render(x, y, type, selected);
      });
      this._render();
   }
   _render(){throw 'override'}
```

구상레이어



구상레이어

구상 렌더러



```
const DivRenderer = class extends ItemRenderer{
   constructor(_parent, bw, bh, img){
      prop(this, {_parent, img, bw, bh, div});
      const div =  el('div');
      div.className = 'block';
      div.style.cssText = `width:${bw}px;height:${bh}px;backgroundImage:url(${img})`;
   }
   get object(){return this.div;}
   find(el){return el == this.div;}
```

```
const ItemRenderer = class{
   get object(){throw 'override';}
   find(v){throw 'override';}
   remove(){return this._remove();}
   move(x, y){return this._move(x, y);}
   render(x, y, type, selected){ this._render(x, y, type, selected);}
   _remove(){throw 'override';}
   _move(x, y){throw 'override';}
   _render(x, y, type, selected){throw 'override';}
};
```

```
const DivRenderer = class extends ItemRenderer{
   _remove(){
      const {div, _parent:parent} = this;
      return new Promise((resolve, reject)=>{
         div.style.transition = "transform ease-in 350ms";
         div.style.transform = "scale(0,0)";
         parent.delayTask(resolve, 350);
      });
   }
```

```
const ItemRenderer = class{
   get object(){throw 'override';}
   find(v){throw 'override';}
   remove(){return this._remove();}
   move(x, y){return this._move(x, y);}
   render(x, y, type, selected){ this._render(x, y, type, selected);}
   _remove(){throw 'override';}
   _move(x, y){throw 'override';}
   _render(x, y, type, selected){throw 'override';}
};
```

```
const DivRenderer = class extends ItemRenderer{
   _move(x, y){
      const {div, bw, bh, _parent:parent} = this;
      return new Promise((resolve, reject)=>{
         const time = (y * bh - parseInt(div.style.top)) / bh * 100;
         div.style.transition = `top ease-in ${time}ms`;
         parent.delayTask(resolve, time);
      });
   }
   _render(x, y, type, selected){
      const {div, bw, bh, img} = this;
      div.style.left = bw * x + "px";
      div.style.top = bh * y + "px";
      div.style.backgroundPosition = -(bw * type) + "px";
      div.style.backgroundPositionY = (selected ? -bh : 0) + "px";
   }
```

```
const ItemRenderer = class{
   get object(){throw 'override';}
   find(v){throw 'override';}
   remove(){return this._remove();}
   move(x, y){return this._move(x, y);}
   render(x, y, type, selected){ this._render(x, y, type, selected);}
   _remove(){throw 'override';}
   _move(x, y){throw 'override';}
   _render(x, y, type, selected){throw 'override';}
```

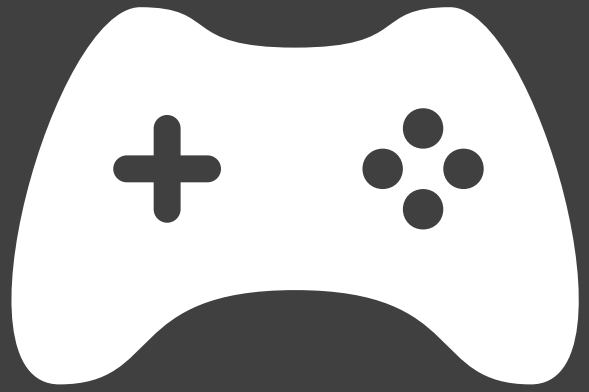
```
const SectionRenderer = class extends Renderer{
  constructor({stage, bg, w, h, c, r, img, itemFactory}){
    super(itemFactory);
    stage = el(stage);
    const bw = parseInt(w/c), bh = parseInt(h/r), _q = [];
    prop(this, {stage, bw, bh, w, h, c, r, img, isdown:false, _q, isAct:null, curr:0});
    stage.style.cssText = `width:${w}px;height:${h}px;background-image:url('${bg}');
       background-size:${bw}px ${bh}px`;
    stage.setAttribute('unselectable', 'on');
    stage.setAttribute('onselectstart', 'return false');
    const f = t=>{
      this.curr = t;
      for(let i = _q.length; i--;){
        const task = _q[i];
        if(task.t <= t){
          _q.splice(i, 1);
          task.f();
        }
      }
      this._renderLoop();
      requestAnimationFrame(f);
    };
    requestAnimationFrame(f);
  }
```

```
const SectionRenderer = class extends Renderer{
  delayTask(f, time){
    this._q.push({f, t:this.curr + time});
  }
  activate(){
    const {stage} = this;
    if(this.isAct === null){
      stage.addEventListener('mousedown', e=>this.isAct && this.dragDown(e));
      stage.addEventListener('mouseup', e=>this.isAct && this.dragUp(e));
      stage.addEventListener('mouseleave', e=>this.isAct && this.dragUp(e));
      stage.addEventListener('mousemove', e=>this.isAct && this.dragMove(e));
    }
    this.isAct = true;
  }
  deactivate(){
    this.isAct = false;
  }

  _add(item){ this.stage.appendChild(item.object);}
  _remove(item){this.stage.removeChild(item.object);}
  _render(){}
```

```
const SectionRenderer = class extends Renderer{
  _getItem(x, y){
    const el = document.elementFromPoint(x, y);
    return this.some(v=>v.find(el));
  }
  dragDown({pageX:x, pageY:y}){
    const item = this._getItem(x, y);
    if(!item) return;
    this.isdown = true;
    this.itemStart(item);
  }
  dragMove({pageX:x, pageY:y}){
    const {isdown} = this;
    if(!isdown) return;
    const item = this._getItem(x, y);
    if(item) this.itemNext(item);
  }
  dragUp({pageX:x, pageY:y}){
    const {isdown} = this;
    if(!isdown) return;
    this.isdown = false;
    this.itemEnd();
  }
```

호스트코드



```
<style>
  #stage{position:relative;display:inline-block;overflow:hidden;border:1px solid #ddd}
  .block{position:absolute;cursor:pointer;overflow:hidden}
</style>
```

```
<style>
  #stage{position:relative;display:inline-block;overflow:hidden;border:1px solid #ddd}
  .block{position:absolute;cursor:pointer;overflow:hidden}
</style>
<section style="text-align:center">
  <h1 style="color:#208AFB">BSIDE TOWER</h1>
  <section id="stage"></section>
</section>
```

```
<style>
  #stage{position:relative;display:inline-block;overflow:hidden;border:1px solid #ddd}
  .block{position:absolute;cursor:pointer;overflow:hidden}
</style>
<section style="text-align:center">
  <h1 style="color:#208AFB">BSIDE TOWER</h1>
  <section id="stage"></section>
</section>

<script src="util.js"></script>
<script src="base.js"></script>
<script src="concreate.js"></script>
```

```
<style>
  #stage{position:relative;display:inline-block;overflow:hidden;border:1px solid #ddd}
  .block{position:absolute;cursor:pointer;overflow:hidden}
</style>
<section style="text-align:center">
  <h1 style="color:#208AFB">BSIDE TOWER</h1>
  <section id="stage"></section>
</section>

<script src="util.js"></script>
<script src="base.js"></script>
<script src="concreate.js"></script>

<script>
const game = new Game({
  column:6, row:6, itemType:'01234'.split(''),
  renderer:new SectionRenderer({
    stage:'#stage', bg:'../img/bg01.gif',
    img:'../img/tower.png', w:400, h:160, r:2, c:5,
    itemFactory:(parent, bw, bh, img)=>new DivRenderer(parent, bw, bh, img)
  })
});
</script>
```

PRACTICE #1

Renderer 클래스에는 레이어를 위반하는 코드가 포함되어있다.
위반하는 부분을 찾아 고치시오.