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Prodi   : D3 Manajemen Informatika

```
                    ┌──────────────┐
                    │     BUKU     │
                    └──────┬───────┘
                           │
                           ▼
                    ┌──────────────┐
                    │    DESAIN    │
                    └──────┬───────┘
                           │
        ┌──────────────┐ ◄─┴─► ┌──────────────┐
        │    UI/UX     │       │   ILUSTRASI  │
        └──────┬───────┘       └──────┬───────┘
               │                      │
  ┌──────┐ ◄───┴──► ┌──────────┐  ┌──────────┐ ◄──┴──► ┌────────────┐
  │ ICON │          │ALIGNMENT │  │PHOTOSHOP │         │ ILLUSTRATOR│
  └──────┘          └──────────┘  └──────────┘         └────────────┘
```
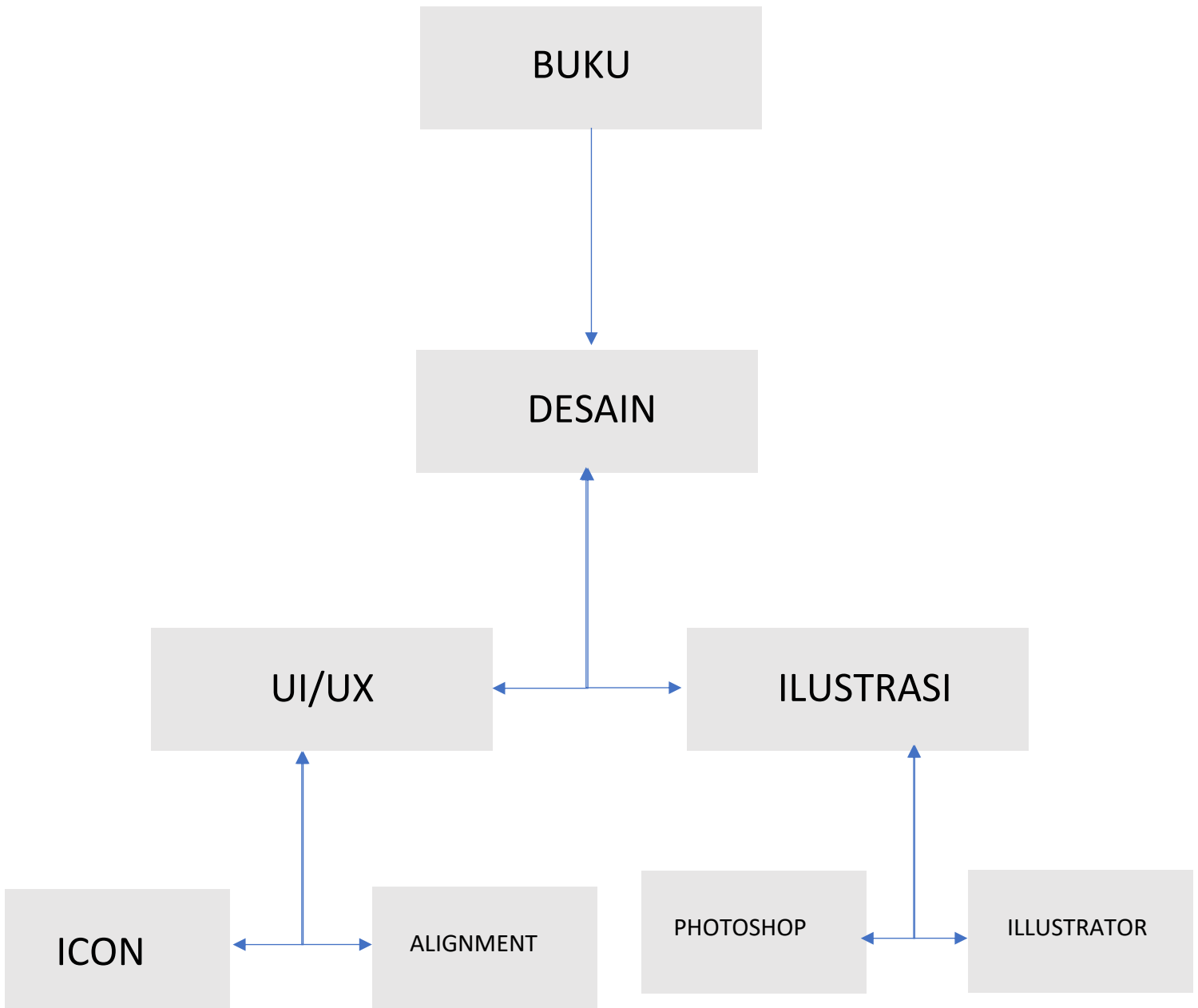
```
Command Prompt - mongo                                                    —    □
> show databases
admin        0.000GB
config       0.000GB
local        0.000GB
njajal       0.000GB
onetomany    0.000GB
pinjam_buku  0.000GB
test         0.000GB
> use buku_withPR
switched to db buku_withPR
> db.buku_desain.insert( { _id: "photoshop", parent: "ilustrasi" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "illustrator", parent: "ilustrasi" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "icon", parent: "ui/ux" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "alignment", parent: "ui/ux" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ilustrasi", parent: "desain" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ui/ux", parent: "desain" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "desain", parent: "buku" } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "buku", parent: null } )
WriteResult({ "nInserted" : 1 })
>
```

```
Command Prompt - mongo                                                    —    □
> db.buku_desain.insert( { _id: "buku", parent: null } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.find().pretty()
{ "_id" : "photoshop", "parent" : "ilustrasi" }
{ "_id" : "illustrator", "parent" : "ilustrasi" }
{ "_id" : "icon", "parent" : "ui/ux" }
{ "_id" : "alignment", "parent" : "ui/ux" }
{ "_id" : "ilustrasi", "parent" : "desain" }
{ "_id" : "ui/ux", "parent" : "desain" }
{ "_id" : "desain", "parent" : "buku" }
{ "_id" : "buku", "parent" : null }
>
```

```
> db.buku_desain.find().pretty()
{ "_id" : "photoshop", "parent" : "ilustrasi" }
{ "_id" : "illustrator", "parent" : "ilustrasi" }
{ "_id" : "icon", "parent" : "ui/ux" }
{ "_id" : "alignment", "parent" : "ui/ux" }
{ "_id" : "ilustrasi", "parent" : "desain" }
{ "_id" : "ui/ux", "parent" : "desain" }
{ "_id" : "desain", "parent" : "buku" }
{ "_id" : "buku", "parent" : null }
> db.buku_desain.findOne( { _id: "icon" } ).parent
ui/ux
> db.buku_desain.createIndex( { parent: 1 } )
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
> db.categories.find( { parent: "ui/ux" } )
> db.buku_desain.find( { parent: "ui/ux" } )
{ "_id" : "icon", "parent" : "ui/ux" }
{ "_id" : "alignment", "parent" : "ui/ux" }
>
```

Model Tree Structures with Child References

```
> show dbs
admin          0.000GB
buku_withPR    0.000GB
config         0.000GB
local          0.000GB
njajal         0.000GB
onetomany      0.000GB
pinjam_buku    0.000GB
test           0.000GB
> use buku_withCR
switched to db buku_withCR
> db.categories.insert( { _id: "photoshop", children: [] } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "illustrator", children: [] } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "ilustrasi", children: [ "photoshop", "illustrator" ] } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "ui/ux", children: [] } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "desain", children: [ "ilustrasi", "ui/ux" ] } )
WriteResult({ "nInserted" : 1 })
> db.categories.insert( { _id: "buku", children: [ "desain" ] } )
WriteResult({ "nInserted" : 1 })
>
```

```
> db.categories.findOne( { _id: "ilustrasi" } ).children
[ "photoshop", "illustrator" ]
```

```
> db.buku_withCR.createIndex( { children: 1 } )
{
        "createdCollectionAutomatically" : true,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
```

---------------- Model Tree Structures with An Array Of Ancestor ---------------

```
> show dbs
admin        0.000GB
buku_withCR  0.000GB
buku_withPR  0.000GB
config       0.000GB
local        0.000GB
njajal       0.000GB
onetomany    0.000GB
pinjam_buku  0.000GB
test         0.000GB
> use buku_withAA
switched to db buku_withAA
> db.buku_desain.insert( { _id: "photoshop", ancestors: [ "buku", "desain", "ilustrasi" ], parent: "ilustrasi" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "illustrator", ancestors: [ "buku", "desain", "ilustrasi" ], parent: "ilustrasi" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ilustrasi", ancestors: [ "buku", "desain" ], parent: "desain" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ui/ux", ancestors: [ "buku", "desain" ], parent: "desain" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "desain", ancestors: [ "buku" ], parent: "buku" } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "buku", ancestors: [ ], parent: null } )
WriteResult({ "nInserted" : 1 })
>
```

```
> db.buku_desain.findOne( { _id: "photoshop" } ).ancestors
[ "buku", "desain", "ilustrasi" ]
> db.buku_desain.createIndex( { ancestors: 1 } )
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
> db.categories.find( { ancestors: "desain" } )
> db.buku_desain.find( { ancestors: "desain" } )
{ "_id" : "photoshop", "ancestors" : [ "buku", "desain", "ilustrasi" ], "parent" : "ilustrasi" }
{ "_id" : "illustrator", "ancestors" : [ "buku", "desain", "ilustrasi" ], "parent" : "ilustrasi" }
{ "_id" : "ilustrasi", "ancestors" : [ "buku", "desain" ], "parent" : "desain" }
{ "_id" : "ui/ux", "ancestors" : [ "buku", "desain" ], "parent" : "desain" }
>
```

--------------------- Model Tree Structures with Materialized Paths ---------------

```
admin        0.000GB
buku_withAA  0.000GB
buku_withCR  0.000GB
buku_withPR  0.000GB
config       0.000GB
local        0.000GB
njajal       0.000GB
onetomany    0.000GB
pinjam_buku  0.000GB
test         0.000GB
> use buku_withMP
switched to db buku_withMP
> db.buku_desain.insert( { _id: "buku", path: null } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "desain", path: ",buku," } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ilustrasi", path: ",buku,desain," } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "ui/ux", path: ",buku,desain," } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "photoshop", path: ",buku,desain,ilustrasi," } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.insert( { _id: "illustrator", path: ",buku,desain,ilustrasi," } )
WriteResult({ "nInserted" : 1 })
> db.buku_desain.find().sort( { path: 1 } )
{ "_id" : "buku", "path" : null }
{ "_id" : "desain", "path" : ",buku," }
{ "_id" : "ilustrasi", "path" : ",buku,desain," }
{ "_id" : "ui/ux", "path" : ",buku,desain," }
{ "_id" : "photoshop", "path" : ",buku,desain,ilustrasi," }
{ "_id" : "illustrator", "path" : ",buku,desain,ilustrasi," }
> db.buku_desain.find( { path: /,desain,/ } )
{ "_id" : "ilustrasi", "path" : ",buku,desain," }
{ "_id" : "ui/ux", "path" : ",buku,desain," }
{ "_id" : "photoshop", "path" : ",buku,desain,ilustrasi," }
{ "_id" : "illustrator", "path" : ",buku,desain,ilustrasi," }
> db.buku_desain.createIndex( { path: 1 } )
{
        "createdCollectionAutomatically" : false,
        "numIndexesBefore" : 1,
        "numIndexesAfter" : 2,
        "ok" : 1
}
>
```