

NBA statistike utakmica i kvote kladionica

FTN Novi Sad



Predmet: Sistemi baza podataka

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Agregacije

1. Odrediti prosečan broj poena igrača na utakmicama u regularnom delu sezone sortiran u opadajućem redosledu.
2. Koliko puta je kladionica JustBet pogrešila u predviđanju kada je dala prednost Lejkersima u plejofu koji su izgubili gostujući u Bostonu?
3. Prikazati minutaže igrača u regularnoj sezoni 2010. godine i broj utakmica koji su odigrali u datoj sezoni. Rezultat sortirati po minutaži igrača.
4. Odredi broj pobeda timova i broj utakmica u regulranim sezonama?
5. Koja kladionica, JustBet ili Heritage, ima veću prosečnu kvotu na klađenjima u ukupan broj poena na utakmicama održanim posle 2010. godini u plejofu?
6. Za sezone održane 1999, 2010. i 2017. odrediti maksimalan broj datih trojki na utakmici.
7. Odrediti prosečan broj ličnih grešaka za tim Denver u periodu od 2000. do 2015.
8. Odrediti prosečan broj poena na utakmicama po sezonama.
9. Koji gostujući timovi su imali najveći hendikep u pobedi u plejofu za kladionicu Heritage(izlistati 5)?
10. Koji igrač je odigrao najveći broj utakmica u plejofu od 2010. godine?

Opis podataka

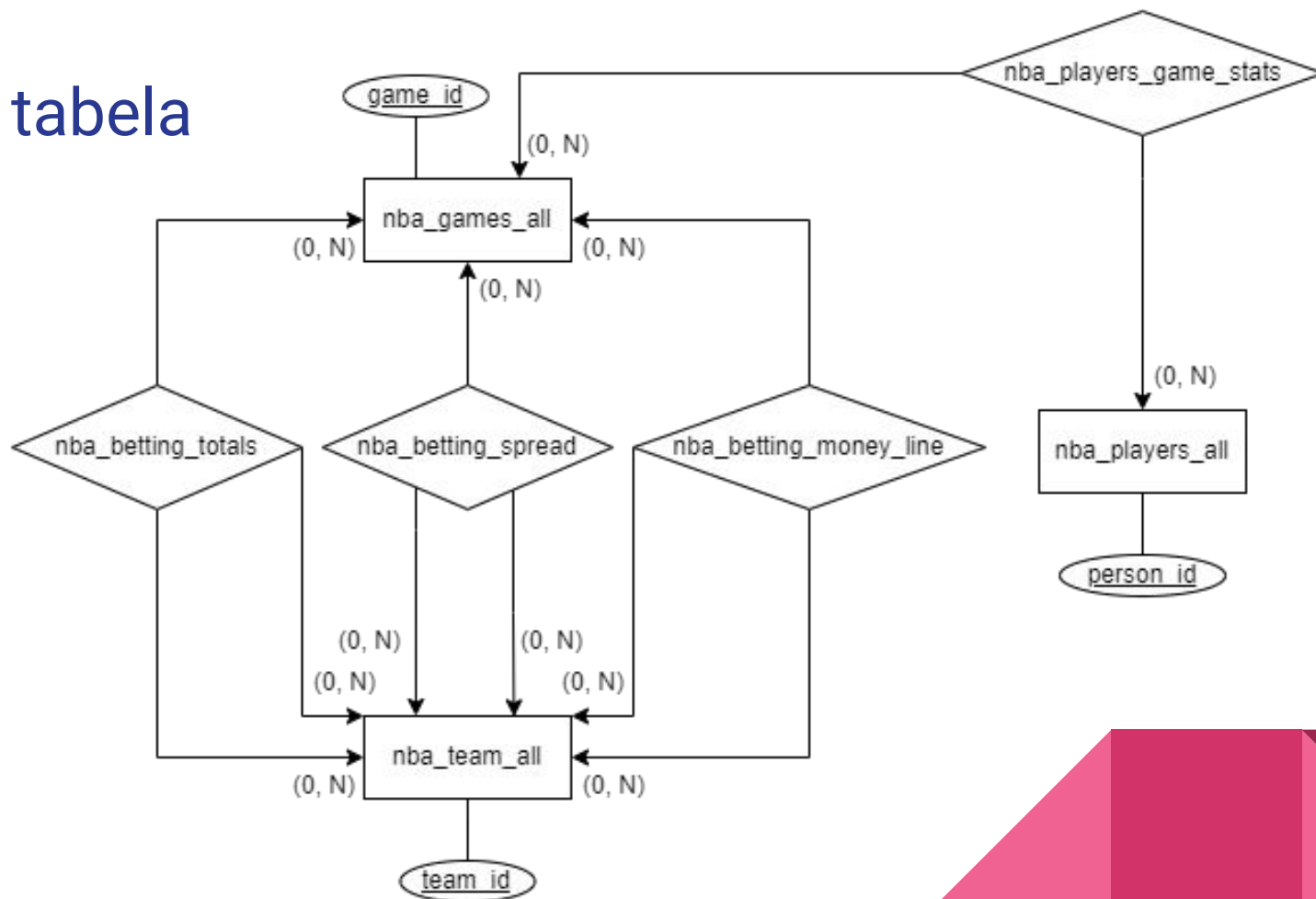
Izvor:

<https://www.kaggle.com/datasets/ehallmar/nba-historical-stats-and-betting-data>

Skup podataka sadrži podatke o statistici i kvotama kladionica od 1946. godine do 2018. godine. Baza se sastoji od 7 csv fajlova.

fajl	igrači	timovi	utakmice	kladenje (hendikep)	kladenje (poeni)	kladenje (pobeda)	statistika igrača (utakmice)
broj obeležja	28	5	32	20	9	7	34

Odnos tabela



Inicijalna logička šema

Kolekcija players_game_stats

```
_id: ObjectId('62a8d209edb13b21ee2d1333')
season_id: "22012"
player_id: "1713"
player_name: "Vince Carter"
team_id: "1610612742"
team_abbreviation: "DAL"
team_name: "Dallas Mavericks"
game_id: "000212000003"
game_date: "2012-10-30"
matchup: "DAL @ LAL"
wl: "W"
min: 27
fgm: 5
fga: 12
fg_pct: 0.417
fg3m: 0
fg3a: 4
```

```
fg3_pct: 0
ftm: 1
fta: 2
ft_pct: 0.5
oreb: 0
dreb: 4
reb: 4
ast: 2
stl: 1
blk: 0
tov: 1
pf: 3
pts: 11
plus_minus: 13
season_type: "Regular Season"
season_year: 2012
season: "2012-13"
```

Inicijalna logička šema

Kolekcija teams i players

```
_id: ObjectId('62a8ac6062adb1f7e41770fa')
league_id: "00"
team_id: "1610612737"
min_year: 1949
max_year: 2018
abbreviation: "ATL"
```

```
_id: ObjectId('62a8ac2162adb1f7e40403f2')
person_id: "76001"
display_last_comma_first: "Abdelnaby, Alaa"
display_first_last: "Alaa Abdelnaby"
rosterstatus: "f"
from_year: 1990
to_year: 1994
playercode: "HISTADD_alaa_abdelnaby"
games_played_flag: "Y"
position: "Forward"
draft_year: 1990
draft_round: 1
draft_num: ""
birth_date: ""
height_feet: 6
height_inches: 10
weight: 240
season_exp: 4
jersey: "30"
school: "Duke"
country: "USA"
last_affiliation: "Duke/USA"
```

Inicijalna logička šema

Kolekcija games

```
_id: ObjectId('62a8acle62adbf7e402193a')
game_id: "0020800741"
game_date: "2009-02-06"
matchup: "SAC vs. UTA"
team_id: "1610612762"
is_home: "f"
wl: "W"
w: 29
l: 22
w_pct: 0.569
min: 240
fgm: 39
fga: 74
fg_pct: 0.527
fg3m: 4
fg3a: 13
fg3_pct: 0.308
ftm: 29
fta: 37
```

```
ft_pct: 1
oreb: 8
dreb: 36
reb: 44
ast: 19
stl: 5
blk: 4
tov: 18
pf: 26
pts: 111
a_team_id: "1610612758"
season_year: 2008
season_type: "Regular Season"
season: "2008-09"
```


Inicijalna logička šema

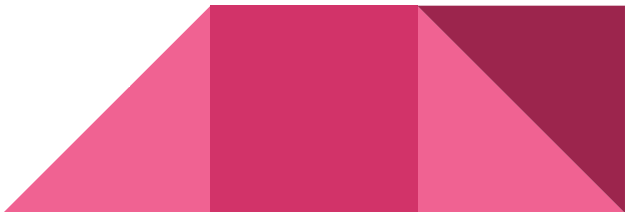
Kolekcija betting_spread

```
_id: ObjectId('62a70dce8da5572726f82b1a')  
game_id: "0021000358"  
book_name: "Pinnacle Sports"  
book_id: "238"  
team_id: "1610612749"  
a_team_id: "1610612742"  
spread1: 7.5  
spread2: -7.5  
price1: -106  
price2: -104
```

Inicijalna logička šema

Kolekcija betting_totals

```
_id: ObjectId('62a70dd48da5572726fa2d84')
game_id: "0021100131"
book_name: "Pinnacle Sports"
book_id: "238"
team_id: "1610612740"
a_team_id: "1610612743"
total1: 192
total2: 192
price1: -105
price2: -105
```



Inicijalna logička šema

Kolekcija betting_money

```
_id: ObjectId('62a70dc78da5572726f641b4')  
game_id: "0041100314"  
book_name: "Pinnacle Sports"  
book_id: "238"  
team_id: "1610612759"  
a_team_id: "1610612760"  
price1: 165  
price2: -183
```

Prilagođena šema

Primenom šablona baketiranja i proširene reference dodate su nove kolekcije:

- season_totals - suma statistika po sezonama
- teams_total - suma statistika timova po sezonama
- player_total_seasons - suma statistika igrača po sezonama
- bet - sadrži plejof utakmice zajedno sa kvotama JustBet kladionice
- fajl: nove_kolekcije.js
- učitavanje baze skripta main.py



Prvi upit

```
//neoptimizovano: 8.727
db.players_game_stats.aggregate([
  { $match: {season_type: "Regular Season"}},
  { $group: { _id: { player_id: "$player_id", player_name: "$player_name"},
    avg_points: { $avg: "$pts" } }},
  { $sort: {"avg_points": -1}},
  { $project : {"player_name": "$_id.player_name", _id: 0, avg_points: 1}}
]);
```

```
//optimizovano: 0.282
db.player_total_seasons.aggregate([
  { $match: {"_id.season_type" : "Regular Season"} },
  {
    $group: {"_id": {player_id: "$_id.player_id", player_name: "$_id.player_name"},
      total_points: {$sum: "$total_pts"}, total_games: {$sum: "$games_played"}}
  },
  {
    $project: {_id: 0, player_name: "$_id.player_name",
      "avg_points": {$divide: ["$total_points", "$total_games"]}}
  },
  {
    $sort: {"avg_points": -1}
  }
]);
```

Prvi upit performanse



Drugi upit

Vreme



```
//neoptimizovano: 7.181s
db.games.aggregate([
  { $match : {wl: "W", is_home: "t", matchup: "LAL @ BOS", season_type: "Playoffs"} },
  {
    $lookup :
    {
      from: "betting_spread",
      localField: "game_id",
      foreignField: "game_id",
      as: "bet"
    }
  },
  { $unwind: "$bet"},
  { $project: {
    "bet.book_name": 1,
    "bet.spread1": 1,
    "bet.spread2": 1,
    "greska": { $gt:["$bet.spread2","$bet.spread1"] }
  }
},
{ $match: {"bet.book_name":"JustBet", greska: true}},
{ $group: {"_id": null, "ukupno_gresaka": {$sum: 1}} },
{ $project: { "ukupno_gresaka": 1, "_id": 0 } }
], {allowDiskUse: true});
```

```
//optimizovano: 0.006s
db.bet.aggregate([
  { $unwind: "$spread" },
  { $match: {wl: "W", matchup: "LAL @ BOS", "spread.book_name": "JustBet"} },
  { $project: {
    "spread.book_name": 1,
    "spread.spread1": 1,
    "spread.spread2": 1,
    "greska": { $gt:["$spread.spread2","$spread.spread1"] }
  }
},
{ $match: {greska: true}},
{ $group: {"_id": null, "ukupno_gresaka": {$sum: 1}} },
{ $project: { "ukupno_gresaka": 1, "_id": 0 } }
]);
```

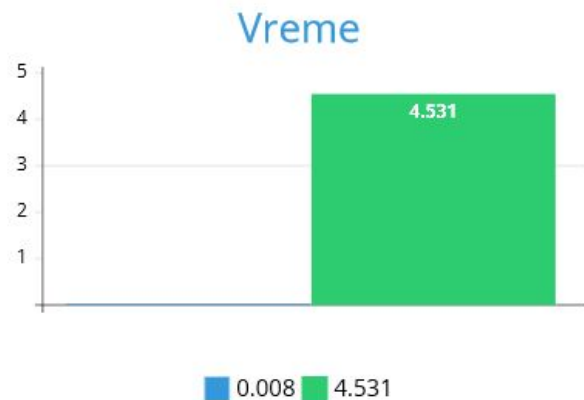
Treći upit

```
//neoptimizovano: 4.531s
db.players_game_stats.aggregate([
  {
    $match: { season_year : 2010, season_type : "Regular Season"}
  },
  {
    $group: {"_id": {player_id: "$player_id", player_name: "$player_name"},
      broj_utakmica: { $sum: 1 } ,
      "vreme_odigrano": { $sum: "$min" }}
  },
  {
    $sort: {"vreme_odigrano": -1}
  }
]);
```

```
//optimizovano: 0.008
db.player_total_seasons.createIndex({"_id.season": 1});

db.player_total_seasons.aggregate([
  {
    $match: { "_id.season" : 2010, "_id.season_type" : "Regular Season"}
  }, {
    $sort: {minutes: -1}
  }, {
    $project: {total_pts: 0, total_fouls: 0}
  }]);
```


Treći upit performanse



Četvrti upit

```
//optimizovano: 0.008s
db.teams_total.aggregate([
  $group: { "_id": {team_id: "$team_id", name: "$naziv"},
            odigrane: {$sum: "$odigrane"}, pobede: {$sum: "$pobede"} },
  $project: { _id: 0, id_tima: "$_id.team_id", naziv: "$_id.name",
              odigrane: 1, pobede: 1 },
  $sort: {pobede: -1}
]);
```

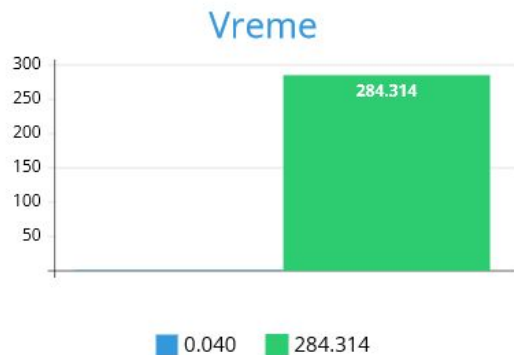


```
//neoptimizovano, vreme: 11.742s
db.createView("teams_games_regular_grouped", "games", [
  $match: {"season_type": "Regular Season"}
], {
  $group: { "_id": "$team_id", "odigrane": {$sum: 1} }
});

db.createView("teams_wins_regular_grouped", "games", [
  $match: {"season_type": "Regular Season", "wl": "W"}
], {
  $group: { "_id": "$team_id", "pobede": {$sum: 1} }
});

db.teams_games_regular_grouped.aggregate([
  $lookup: {
    from: "teams_wins_regular_grouped",
    localField: "_id",
    foreignField: "_id",
    as: "wins"
  },
  $project: { _id: 1, odigrane: 1, pobede: "$wins.pobede" },
  $unwind: "$pobede",
  $lookup: {
    from: "teams",
    localField: "_id",
    foreignField: "team_id",
    as: "team_info"
  },
  $project: { odigrane: 1, pobede: 1, name: "$team_info.abbreviation" },
  $unwind: "$name",
  $sort: {pobede: -1}
]);
```

Peti upit



//optimizovano: 0.040s

```
db.bet.aggregate([  
  $unwind: "$totals"  
], {  
  $match: {"totals.price1": {$lt: 0}}  
}, {  
  $group: {_id: "$totals.book_name", avg: {$avg: "$totals.price1"}}  
}]);
```

```
db.games.aggregate([  
  {  
    $match: { is_home: "t", season_type: "Playoffs" }  
  },  
  {  
    $lookup: {  
      from: "bet_totals_filtrirano",  
      localField: "game_id",  
      foreignField: "game_id",  
      as: "totals"  
    }  
  },  
  {  
    $unwind: "$totals"  
  },  
  {  
    $match: {"totals.price1": {$lt: 0}}  
  },  
  {  
    $group: {_id: "$totals.book_name", avg: {$avg: "$totals.price1"}}  
  }  
]);
```

Šesti upit

```
//neoptimizovano: 0.632
db.games.aggregate([
  $match: {"season_year": {$gte: 1980}}
], {
  $group: {"_id": "$season_year", "trojke": {$max: "$fg3m"}}
}, {
  $project: {"_id": 1, "trojke": 1}
}, {
  $sort: {"trojke": -1}
}]);
```

```
//optimizovano: 0.005
db.season_totals.aggregate([
  $match: {"season": {$gte: 1980}}
], {
  $project: {_id: 0, "season": 1, "max 3s": 1}
}, {
  $sort: {"max 3s": -1}
}]);
```



Sedmi upit

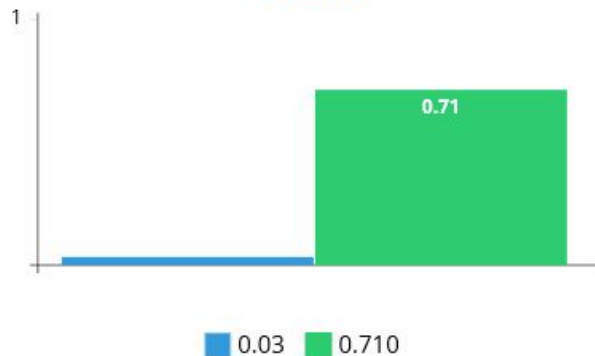


```
//neoptimizovano: 11.581
db.games.aggregate([
  $match: {"season_type": "Regular Season", "season_year": {$gte: 2000, $lte: 2015}}
], {
  $lookup: {
    from: "teams",
    localField: "team_id",
    foreignField: "team_id",
    as: "team_info"
  }
}, {
  $match: {"team_info.abbreviation": "DEN"}
}, {
  $group: {"_id": "$team_info.abbreviation", "prosek_faulova": {$avg: "$pf"}}
}, {
  $unwind: "$_id"
}, {
  $project: {_id: 0, tim: "$_id", prosek_faulova: 1}
}]);
```

```
//optimizovano: 0.007
db.teams_total.aggregate([
  $match: {naziv: "DEN", "season": {$gte: 2000, $lte: 2015}}
], {
  $group: {_id: {tim_id: "$team_id", naziv: "$naziv"}, suma_faulova: {$sum: "$faulovi"},
    suma_odigranih: {$sum: "$odigrane"}}
}, {
  $project: {_id: 0, naziv: "$_id.naziv",
    "prosek_faulova": {$divide: ["$suma_faulova", "$suma_odigranih"]}}
}]);
```

Osmi upit

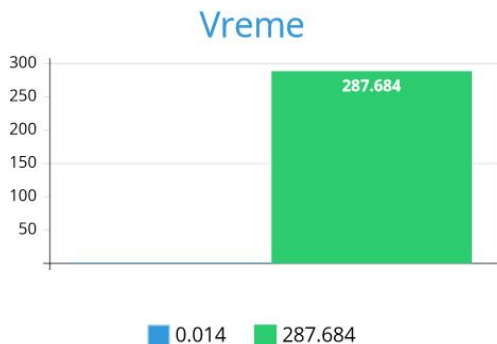
Vreme



```
// neoptimizovano: 0.610
db.games.aggregate([
  $group: {"_id": "$season", "prosek_poena": {$avg: "$pts"}},
  {
    $sort: {"prosek_poena": -1}
  }
]);
```

```
// optimizovano: 0.03
db.season_totals.aggregate([
  $project: {_id: 0, "points_per_game": {$divide: ["$points", "$games"]}, "season": 1},
  {
    $sort: {"points_per_game": -1}
  }
]);
```

Deveti upit

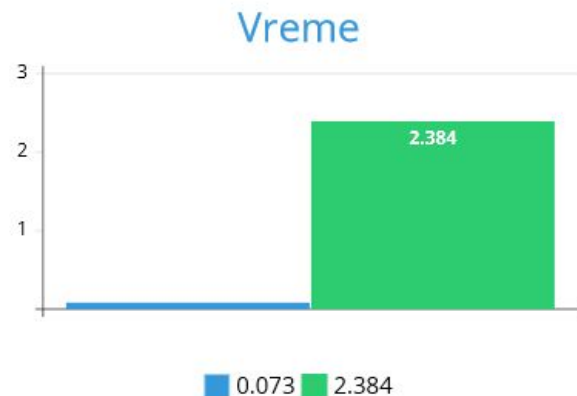


```
//optimizovano: 0.014s
db.bet.aggregate([
  { $unwind: "$spread" },
  {
    $match: {w1: "L", "spread.book_name": "Heritage"}
  }, {
    $project: {matchup: 1, spread: "$spread.spread1", season: 1}
  }, {
    $sort: {"spread": -1}
  }, {
    $limit: 5
  }
]);
```

```
//neoptimizovano: 4:47:684
db.games.aggregate([
  {
    $match: { is_home: "t", season_type: "Playoffs", "w1": "L" }
  }, {
    $lookup: {
      from: "bet_spread_filtrirano",
      localField: "game_id",
      foreignField: "game_id",
      as: "spread"
    }
  }, {
    $unwind: "$spread"
  }, {
    $match: {"spread.book_name": "Heritage"}
  }, {
    $project: {matchup: 1, spread: "$spread.spread1", season: 1}
  }, {
    $sort: {"spread": -1}
  }, {
    $limit: 5
  }
]);
```


Deseti upit

```
//neoptimizovano: 2.384s
db.players_game_stats.aggregate([
  $match: {"season_type": "Playoffs", "season_year": {$gt: 2010}},
  $group: {"_id": {"player_id": "$player_id", "player": "$player_name"},
    "plejof_utakmice": {$sum: 1}},
  $sort: {"plejof_utakmice": -1}
]);
```



```
//optimizovano: 0.073
db.player_total_seasons.aggregate([
  $match: {"_id.season_type": "Playoffs", "_id.season": {$gt: 2010}},
  $group: {_id: {player_id: "$_id.player_id", player_name: "$_id.player_name"},
    plejof_utakmice: {$sum: "$games_played"}},
  $sort: {plejof_utakmice: -1}
]);
```


The image features two side-by-side portraits of men. The man on the left is white with short, light brown hair and a light beard. The man on the right is Black with short black hair and a full black beard. Both are wearing light blue shirts with dark blue and red trim. The background is dark with a repeating geometric pattern. A semi-transparent black rectangle is centered over the image, containing the text 'Hvala na pažnji!' in white.

Hvala na pažnji!