

1. List all landmarks in France and the USA, their location details, and their country name.

CODE:

```
db.landmarks.aggregate([
  {
    $lookup: {
      from: "countries",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "countryDetails"
    }
  },
  { $unwind: "$countryDetails" },
  {
    $match: {
      "countryDetails.CountryName": { $in: ["France", "USA"] }
    }
  },
  {
    $project: {
      LandmarkID: 1,
      LandmarkName: 1,
      Location: 1,
      CountryName: "$countryDetails.CountryName",
      _id: 0
    }
  }
]);
```

```
> use LandmarksDB
< switched to db LandmarksDB
> db.landmarks.aggregate([
  {
    $lookup: {
      from: "countries",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "countryDetails"
    }
  },
  { $unwind: "$countryDetails" },
  {
    $match: {
      "countryDetails.CountryName": { $in: ["France", "USA"] }
    }
  },
  {
    $project: {
      LandmarkID: 1,
      LandmarkName: 1,
      Location: 1,
      CountryName: "$countryDetails.CountryName",
      _id: 0
    }
  }
]);
```

RESULTS:

```
{
  LandmarkID: 1,
  LandmarkName: 'Eiffel Tower',
  Location: 'Paris',
  CountryName: 'France'
}
{
  LandmarkID: 4,
  LandmarkName: 'Statue of Liberty',
  Location: 'New York',
  CountryName: 'USA'
}
{
  LandmarkID: 41,
  LandmarkName: 'Louvre Museum',
  Location: 'Paris',
  CountryName: 'France'
}
{
  LandmarkID: 42,
  LandmarkName: 'Notre-Dame Cathedral',
  Location: 'Paris',
  CountryName: 'France'
}
{
  LandmarkID: 43,
  LandmarkName: 'Palace of Versailles',
  Location: 'Versailles',
  CountryName: 'France'
}
{
  LandmarkID: 47,
  LandmarkName: 'Brooklyn Bridge',
  Location: 'New York',
  CountryName: 'USA'
}
```

```
{
  LandmarkID: 48,
  LandmarkName: 'Empire State Building',
  Location: 'New York',
  CountryName: 'USA'
}
{
  LandmarkID: 49,
  LandmarkName: 'Central Park',
  Location: 'New York',
  CountryName: 'USA'
}
{
  LandmarkID: 59,
  LandmarkName: 'Moulin Rouge',
  Location: 'Paris',
  CountryName: 'France'
}
{
  LandmarkID: 60,
  LandmarkName: 'Arc de Triomphe',
  Location: 'Paris',
  CountryName: 'France'
}
{
  LandmarkID: 69,
  LandmarkName: 'Fort Sumter',
  Location: 'Charleston',
  CountryName: 'USA'
}
```

2. List the Total Number of Landmarks in Each Country

CODE:

```
db.countries.aggregate([
  {
    $lookup: {
      from: "landmarks",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "landmarks"
    }
  },
  {
    $project: {
      CountryName: 1,
      TotalLandmarks: { $size: "$landmarks" }
    }
  }
]);
```

```
> use LandmarksDB
< switched to db LandmarksDB
> db.countries.aggregate([
  {
    $lookup: {
      from: "landmarks",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "landmarks"
    }
  },
  {
    $project: {
      CountryName: 1,
      TotalLandmarks: { $size: "$landmarks" }
    }
  }
]);
```

RESULTS:

```
< {
  _id: ObjectId('6733a8f26f3cbffa46560954'),
  CountryName: 'France',
  TotalLandmarks: 6
}
{
  _id: ObjectId('6733a8f26f3cbffa46560955'),
  CountryName: 'USA',
  TotalLandmarks: 5
}
{
  _id: ObjectId('6733a8f26f3cbffa46560956'),
  CountryName: 'China',
  TotalLandmarks: 8
}
{
  _id: ObjectId('6733a8f26f3cbffa46560957'),
  CountryName: 'Egypt',
  TotalLandmarks: 3
}
{
  _id: ObjectId('6733a8f26f3cbffa46560958'),
  CountryName: 'Brazil',
  TotalLandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560959'),
  CountryName: 'Italy',
  TotalLandmarks: 4
}
{
  _id: ObjectId('6733a8f26f3cbffa4656095a'),
  CountryName: 'Australia',
  TotalLandmarks: 1
}
```

```
{
  _id: ObjectId('6733a8f26f3cbffa4656095b'),
  CountryName: 'India',
  TotalLandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa4656095c'),
  CountryName: 'Mexico',
  TotalLandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa4656095d'),
  CountryName: 'Japan',
  TotalLandmarks: 4
}
{
  _id: ObjectId('6733a8f26f3cbffa4656095e'),
  CountryName: 'Germany',
  TotalLandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa4656095f'),
  CountryName: 'Canada',
  TotalLandmarks: 2
}
{
  _id: ObjectId('6733a8f26f3cbffa46560960'),
  CountryName: 'Russia',
  TotalLandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560961'),
  CountryName: 'South Korea',
  TotalLandmarks: 0
}
```

```
{
  _id: ObjectId('6733a8f26f3cbffa46560962'),
  CountryName: 'Argentina',
  Totallandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560963'),
  CountryName: 'Spain',
  Totallandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560964'),
  CountryName: 'Turkey',
  Totallandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560965'),
  CountryName: 'South Africa',
  Totallandmarks: 1
}
{
  _id: ObjectId('6733a8f26f3cbffa46560966'),
  CountryName: 'United Kingdom',
  Totallandmarks: 5
}
{
  _id: ObjectId('6733a8f26f3cbffa46560967'),
  CountryName: 'Indonesia',
  Totallandmarks: 1
}
Type "it" for more
LandmarksDB>
```

3. Identify All Landmarks Established After 1900 That Have a Heritage Status

CODE:

```
db.landmarks.aggregate([
  {
    $match: {
      YearEstablished: { $gt: 1900 },
      HeritageStatusID: { $ne: null }
    }
  },
  {
    $project: {
      LandmarkID: 1,
      LandmarkName: 1,
      YearEstablished: 1,
      HeritageStatusID: 1,
      _id: 0
    }
  }
]);
```



```

> db.landmarks.aggregate([
  {
    $match: {
      YearEstablished: { $gt: 1900 },
      HeritageStatusID: { $ne: null }
    }
  },
  {
    $project: {
      LandmarkID: 1,
      LandmarkName: 1,
      YearEstablished: 1,
      HeritageStatusID: 1,
      _id: 0
    }
  }
]);

```

RESULTS:

```

< {
  LandmarkID: 5,
  LandmarkName: 'Christ the Redeemer',
  YearEstablished: 1931,
  HeritageStatusID: 1
}
{
  LandmarkID: 7,
  LandmarkName: 'Sydney Opera House',
  YearEstablished: 1973,
  HeritageStatusID: 1
}
{
  LandmarkID: 11,
  LandmarkName: 'CN Tower',
  YearEstablished: 1976,
  HeritageStatusID: 1
}
{
  LandmarkID: 48,
  LandmarkName: 'Empire State Building',
  YearEstablished: 1931,
  HeritageStatusID: 1
}

```

4. Identify Unique Pairs of Landmarks Located in the Same Country and City

```
db.landmarks.aggregate([
{
  $lookup: {
    from: "landmarks",
    localField: "CountryID",
    foreignField: "CountryID",
    as: "matchedLandmarks"
  }
},
{
  $unwind: "$matchedLandmarks"
},
{
  $match: {
    $expr: {
      $and: [
        { $eq: ["$Location", "$matchedLandmarks.Location"] },
        { $lt: ["$LandmarkID", "$matchedLandmarks.LandmarkID"] }
      ]
    }
  }
},
{
  $project: {
    _id: 0,
    Landmark1ID: "$LandmarkID",
    Landmark2ID: "$matchedLandmarks.LandmarkID",
    Location: "$Location"
  }
}
```

```
}  
}  
]);
```

```
> db.landmarks.aggregate([  
  {  
    $lookup: {  
      from: "landmarks",  
      localField: "CountryID",  
      foreignField: "CountryID",  
      as: "matchedLandmarks"  
    }  
  },  
  {  
    $unwind: "$matchedLandmarks"  
  },  
  {  
    $match: {  
      $expr: {  
        $and: [  
          { $eq: ["$Location", "$matchedLandmarks.Location"] },  
          { $lt: ["$LandmarkID", "$matchedLandmarks.LandmarkID"] }  
        ]  
      }  
    }  
  },  
  {  
    $project: {  
      _id: 0,  
      Landmark1ID: "$LandmarkID",  
      Landmark2ID: "$matchedLandmarks.LandmarkID",  
      Location: "$Location"  
    }  
  }  
]);
```

RESULTS:

```
< {
  Landmark1ID: 1,
  Landmark2ID: 41,
  Location: 'Paris'
}
{
  Landmark1ID: 1,
  Landmark2ID: 42,
  Location: 'Paris'
}
{
  Landmark1ID: 1,
  Landmark2ID: 59,
  Location: 'Paris'
}
{
  Landmark1ID: 1,
  Landmark2ID: 60,
  Location: 'Paris'
}
{
  Landmark1ID: 2,
  Landmark2ID: 44,
  Location: 'Beijing'
}
{
  Landmark1ID: 2,
  Landmark2ID: 45,
  Location: 'Beijing'
}
{
  Landmark1ID: 2,
  Landmark2ID: 46,
  Location: 'Beijing'
}
}
```

```
{
  Landmark1ID: 4,
  Landmark2ID: 47,
  Location: 'New York'
}
{
  Landmark1ID: 4,
  Landmark2ID: 48,
  Location: 'New York'
}
{
  Landmark1ID: 4,
  Landmark2ID: 49,
  Location: 'New York'
}
{
  Landmark1ID: 6,
  Landmark2ID: 50,
  Location: 'Rome'
}
{
  Landmark1ID: 6,
  Landmark2ID: 51,
  Location: 'Rome'
}
{
  Landmark1ID: 6,
  Landmark2ID: 52,
  Location: 'Rome'
}
{
  Landmark1ID: 16,
  Landmark2ID: 73,
  Location: 'London'
}
}
```

```
{
  Landmark1ID: 41,
  Landmark2ID: 42,
  Location: 'Paris'
}
{
  Landmark1ID: 41,
  Landmark2ID: 59,
  Location: 'Paris'
}
{
  Landmark1ID: 41,
  Landmark2ID: 60,
  Location: 'Paris'
}
{
  Landmark1ID: 42,
  Landmark2ID: 59,
  Location: 'Paris'
}
{
  Landmark1ID: 42,
  Landmark2ID: 60,
  Location: 'Paris'
}
{
  Landmark1ID: 44,
  Landmark2ID: 45,
  Location: 'Beijing'
}
}
```

5. Identify countries with landmarks that include the terms "citadel", "fort" or "castle" in their description

CODE:

```
db.landmarks.aggregate([
  {
    $match: {
      $or: [
        { Description: { $regex: "citadel", $options: "i" } },
        { Description: { $regex: "fort", $options: "i" } },
        { Description: { $regex: "castle", $options: "i" } }
      ]
    }
  },
  {
    $lookup: {
      from: "countries",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "countryDetails"
    }
  },
  {
    $unwind: "$countryDetails"
  },
  {
    $group: {
      _id: "$countryDetails.CountryName",
      descriptions: { $push: "$Description" }
    }
  }
])
```

```

    }
  },
  {
    $project: {
      _id: 0,
      CountryName: "$_id",
      Descriptions: "$descriptions"
    }
  }
});

```

```

LandmarksDB > db.landmarks.aggregate([
  {
    $match: {
      $or: [
        { Description: { $regex: "citadel", $options: "i" } },
        { Description: { $regex: "fort", $options: "i" } },
        { Description: { $regex: "castle", $options: "i" } }
      ]
    }
  },
  {
    $lookup: {
      from: "countries",
      localField: "CountryID",
      foreignField: "CountryID",
      as: "countryDetails"
    }
  },
  {
    $unwind: "$countryDetails"
  },
  {
    $group: {
      _id: "$countryDetails.CountryName",
      descriptions: { $push: "$Description" }
    }
  },
  {
    $project: {
      _id: 0,
      CountryName: "$_id",
      Descriptions: "$descriptions"
    }
  }
]);

```

RESULTS:

```
< {  
  CountryName: 'China',  
  Descriptions: [  
    'A series of fortifications built to protect China.',  
    'A fortress city famous for its defense during the Yuan Dynasty.',  
    'A city fortification built to protect Nanjing, the capital of the early Ming dynasty.',  
    "A fortification overlooking the world's largest stone Buddha."  
  ]  
}  
{  
  CountryName: 'United Kingdom',  
  Descriptions: [  
    'A historic fortress which dominates the skyline of Edinburgh, Scotland.',  
    'A historic castle located on the north bank of the River Thames in central London.',  
    'A medieval castle in Dover, Kent, known as the Key to England."',  
    'A royal residence in Berkshire, the oldest and largest occupied castle in the world.'  
  ]  
}  
{  
  CountryName: 'Egypt',  
  Descriptions: [  
    'A medieval Islamic-era fortification in Cairo, Egypt.',  
    'A 15th-century fortress located on the Mediterranean Sea coast in Alexandria, Egypt.'  
  ]  
}  
{  
  CountryName: 'Malta',  
  Descriptions: [  
    'A star fort in Valletta, Malta, built by the Knights Hospitaller.'  
  ]  
}  
{  
  CountryName: 'Canada',  
  Descriptions: [  
    'An active military installation and a historic fortress in Quebec City, Canada.'  
  ]  
}
```

```
{  
  CountryName: 'Syria',  
  Descriptions: [  
    'A large medieval citadel located in Aleppo, Syria.'  
  ]  
}  
{  
  CountryName: 'USA',  
  Descriptions: [  
    'A sea fort in Charleston, South Carolina, known for two battles of the American Civil War.'  
  ]  
}  
LandmarksDB >
```