\documentclass[12pt]{article}

\usepackage{fancyhdr}

\usepackage{graphicx}

\usepackage{geometry}

\usepackage{fontspec} % For using Times New Roman

\usepackage{listings} % For code formatting

\usepackage{xcolor} % For coloring in code listings

% Set main font

\setmainfont{Times New Roman}

% Page layout

\geometry{margin=0.75in}

\pagestyle{fancy}

\fancyhf{}

\fancyhead[L]{MongoDB Report}

\fancyfoot[L]{Dept. of Computer Science and Business System}

\fancyfoot[R]{\thepage}

\renewcommand{\footrulewidth}{0.5pt}

% Listings configuration for Times New Roman at 14pt

\lstset{

basicstyle=\rmfamily\fontsize{14}{16}\selectfont,

backgroundcolor=\color{white!10},

frame=single,

breaklines=true,

columns=fullflexible,

keywordstyle=\color{blue},

commentstyle=\color{green!60!black},

stringstyle=\color{red!70!black},

showstringspaces=false

}

\begin{document}

% Title

\begin{center}

\fontsize{18}{20}\selectfont

\textbf{\underline{EXPERIMENT 1:}}\\

\end{center}

\vspace{0.5em}

{\fontsize{14}{17}\selectfont

\textbf{a. Illustration of Where Clause, AND, OR operations in MongoDB.}

}

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}

}

\vspace{0.5em}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the database}}

\begin{lstlisting}

> use mongodb\_lab

\end{lstlisting}

\vspace{0.5em}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the collection inside the database}}

\begin{lstlisting}

> db.createCollection("MovieCollection")

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture1.png}

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Inserting Values into the collection}}\\[0.5em]

\noindent{\fontsize{14}{17}\selectfont\textbf{// Method 1: Insert a single document}}

\begin{lstlisting}

> db.MovieCollection.insertOne({

\_id: 1,

title: "The Shawshank Redemption",

director: "Frank Darabont",

genre: "Drama",

year: 1994,

rating: 9.3

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture2.png}

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Method 2: Insert multiple documents into the collection}}

\begin{lstlisting}

> db.MovieCollection.insertMany([

{

\_id: 2,

title: "The Godfather",

director: "Francis Ford Coppola",

genre: "Crime",

year: 1972,

rating: 9.2

},

{

\_id: 3,

title: "The Dark Knight",

director: "Christopher Nolan",

genre: "Action",

year: 2008,

rating: 9.0

},

{

\_id: 4,

title: "Pulp Fiction",

director: "Quentin Tarantino",

genre: "Crime",

year: 1994,

rating: 8.9

},

{

\_id: 5,

title: "Fight Club",

director: "David Fincher",

genre: "Drama",

year: 1999,

rating: 8.8

},

{

\_id: 6,

title: "Inception",

director: "Christopher Nolan",

genre: "Sci-Fi",

year: 2010,

rating: 8.8

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture3.png}

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Displaying documents within the collection}}

\begin{lstlisting}

> db.MovieCollection.find()

Or

> db.MovieCollection.find().pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture4.png}

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Displaying documents based on condition(s) using \$where}}

\begin{lstlisting}

> db.MovieCollection.find({ $where: "this.year == 2008" }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture5.png}

\end{center}

\newpage

{\fontsize{14}{17}\selectfont

\textbf{b. Execute the Commands of MongoDB and operations in MongoDB: Insert, Query,

update, Delete and Projection. (Note: use any collection)

}

}\\[0.9em]

\noindent{\fontsize{14}{17}\selectfont\textbf{// Logical Operators}}\\[0.5em]

\noindent{\fontsize{14}{17}\selectfont\textbf{// AND operation(\$and)}}\\

\begin{lstlisting}

> db.MovieCollection.find({

$and: [

{ genre: "Drama" },

{ year: 1994 }

]

}).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture6.png}

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using \$or}}\\

\begin{lstlisting}

> db.MovieCollection.find({

$or: [

{ genre: "Action" },

{ year: 2010 }

]

}).pretty()

}

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture7.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using \$in}}\\

\begin{lstlisting}

> db.MovieCollection.find({

genre: { $in: ["Action", "Drama"] }

}).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture8.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using \$nin}\\

\begin{lstlisting}

> db.MovieCollection.find({

genre: { $nin: ["Action", "Drama"] }

}).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture9.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Comparison Operators}\\[0.5em]

\noindent{\fontsize{14}{17}\selectfont\textbf{// Greater than(\$gt)}\\

\begin{lstlisting}

> db.MovieCollection.find({ year: { $gt: 2000 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture10.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Greater than or equal(\$gte)}\\

\begin{lstlisting}

> db.MovieCollection.find({ year: { $gte: 2000 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture11.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Less than(\$It)}\\

\begin{lstlisting}

> db.MovieCollection.find({ year: { $lt: 2000 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture13.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Less than or equal(\$Ite)}\\

\begin{lstlisting}

> db.MovieCollection.find({ year: { $lte: 2000 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture14.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// Not equal(\$ne)}\\

\begin{lstlisting}

> db.MovieCollection.find({ year: { $ne: 2000 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture15.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Update Operations}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Update one document}\\

\begin{lstlisting}

> db.MovieCollection.updateOne(

{ title: "Inception" },

{ $set: { rating: 8.9 }, $inc: { year: 1 } }

)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture16.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Update multiple documents}}\\

\begin{lstlisting}

> db.MovieCollection.updateMany(

{ director: "Christopher Nolan" },

{ $set: { franchise: "Nolan Collection" } }

)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture17.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Replace a document}}\\

\begin{lstlisting}

> db.MovieCollection.replaceOne(

{ \_id: 4 },

{

title: "Pulp Fiction",

director: "Quentin Tarantino",

genre: "Crime",

year: 1994,

rating: 9.0,

awards: ["Palme d'Or"]})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture18.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using findAndModify()}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Basic update (returns original document)}}\\

\begin{lstlisting}

> db.MovieCollection.findAndModify({

query: { genre: "Sci-Fi" },

update: { $set: { title: "Inception: Director's Cut", year: 2011 } }

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture19.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Update and return new document}}\\

\begin{lstlisting}

> db.MovieCollection.findAndModify({

query: { genre: "Sci-Fi" },

update: { $set: { title: "Inception: Director's Cut", year: 2011 } },

new: true

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture20.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Remove Operation}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Remove a document}}\\

\begin{lstlisting}

> db.MovieCollection.findAndModify({

query: { genre: "Sci-Fi" },

sort: { rating: 1 }, // Optional sort before removal

remove: true

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture21.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Upsert Operation}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Upsert - updates if exists, inserts if doesn't}}\\

\begin{lstlisting}

> db.MovieCollection.findAndModify({

query: { genre: "Animation" },

update: {

$set: {

title: "Toy Story",

director: "John Lasseter",

year: 1995,

rating: 8.3

}

},

upsert: true,

new: true

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture22.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Delete Operations}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Delete single document}}\\

\begin{lstlisting}

> db.MovieCollection.deleteOne({ \_id: 3 }) // Delete The Dark Knight

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture23.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Delete multiple documents}}\\

\begin{lstlisting}

> db.MovieCollection.deleteMany({ year: { $lt: 2000 } }) // Delete movies before 2000

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture24.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Delete all documents}}\\

\begin{lstlisting}

> db.MovieCollection.deleteMany({}) // Delete all documents in collection

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture25.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Verify deletions}}\\

\begin{lstlisting}

> db.MovieCollection.find().pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture26.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Projection Operations}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Include specific fields (with \\_id)}\\

\begin{lstlisting}

> db.MovieCollection.find({}, { genre: 1, title: 1, rating: 1 })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture27.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// Exclude \\_id field}}\\

\begin{lstlisting}

> db.MovieCollection.find({}, { genre: 1, title: 1, rating: 1, \_id: 0 })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture28.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Projection with Conditions}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// For specific movie}}\\

\begin{lstlisting}

> db.MovieCollection.find(

{ title: "The Shawshank Redemption" },

{ director: 1, year: 1, \_id: 0 }

)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture29.png}\\

\end{center}

\vspace{2em}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

\vspace{1em}

\begin{center}

\renewcommand{\arraystretch}{1.5} % More spacing between rows

\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

\hline

\vspace{3em} & \\

\hline

\end{tabular}

\end{center}

\newpage

\begin{center}

\fontsize{18}{20}\selectfont

\textbf{\underline{EXPERIMENT 2:}}\\

\end{center}

\vspace{0.5em}

{\fontsize{14}{17}\selectfont

\textbf{a. Develop a MongoDB query to select certain fields and ignore some fields of the documents from any collection.}

}

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// To retrieve specific include field values or document in collection By using 1 and 0 can retrieve the details of specific fields of the documents.}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture30.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Inserting Values into the collection}}\\

\begin{lstlisting}

> db.Movies.insertMany([

{

\_id: "M001",

title: "Inception",

director: "Christopher Nolan",

genre: "Sci-Fi",

year: 2010,

rating: 8.8,

actors: ["Leonardo DiCaprio", "Joseph Gordon-Levitt"],

budget: 160000000

},

{

\_id: "M002",

title: "The Shawshank Redemption",

director: "Frank Darabont",

genre: "Drama",

year: 1994,

rating: 9.3,

actors: ["Tim Robbins", "Morgan Freeman"],

budget: 25000000

},

{

\_id: "M003",

title: "Parasite",

director: "Bong Joon Ho",

genre: "Thriller",

year: 2019,

rating: 8.6,

actors: ["Song Kang-ho", "Lee Sun-kyun"],

budget: 11400000

},

{

\_id: "M004",

title: "Pulp Fiction",

director: "Quentin Tarantino",

genre: "Crime",

year: 1994,

rating: 8.9,

actors: ["John Travolta", "Uma Thurman"],

budget: 8000000

},

{

\_id: "M005",

title: "The Dark Knight",

director: "Christopher Nolan",

genre: "Action",

year: 2008,

rating: 9.0,

actors: ["Christian Bale", "Heath Ledger"],

budget: 185000000

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture31.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// To retrieve specific include field values or document in collection By using 1 and 0 can retrieve the details of specific fields of the documents}}\\

\begin{lstlisting}

> db.Movies.find({}, {title: 1, genre: 1, rating: 1})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture32.png}\\

\end{center}

\begin{lstlisting}

> db.Movies.find( {director: "Christopher Nolan"}, {title: 1, year: 1, \_id: 0})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture33.png}\\

\end{center}

\begin{lstlisting}

> db.Movies.find({}, {title: 1, genre: 1, rating: 1, \_id: 0})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture34.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{b. Develop a MongoDB query to display the first 5 documents from the results obtained.[use of limit and find]}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// display number of documents in the collection}}\\

\begin{lstlisting}

> db.Movies.countDocuments()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture35.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//display first 3 documents}}\\

\begin{lstlisting}

> db.Movies.find().limit(3)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture36.png}\\

\end{center}

\begin{lstlisting}

> db.Movies.find({}, {title: 1, director: 1, \_id: 0}).limit(3)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture38.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//display 3rd document onwards by skipping first 2}}\\

\begin{lstlisting}

> db.Movies.find().skip(2)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture39.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Sorting the documents using sort()}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Sort by Title (A-Z)}}\\

\begin{lstlisting}

> db.Movies.find().sort({title: 1})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture40.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Sort by Year (Newest First) + Limit}}\\

\begin{lstlisting}

> db.Movies.find({}, {title: 1, year: 1, \_id: 0}.sort({year: -1} .limit(3)

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture41.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Sort by Rating (Highest First)}}\\

\begin{lstlisting}

> db.Movies.find({}, {title: 1, rating: 1, \_id: 0}).sort({rating: -1})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture42.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

\vspace{0.5pt}

\begin{center}

\renewcommand{\arraystretch}{1.5} % More spacing between rows

\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

\hline

\vspace{3em} & \\

\hline

\end{tabular}

\end{center}

\newpage

\begin{center}

\fontsize{18}{20}\selectfont

\textbf{\underline{EXPERIMENT 3:}}\\

\end{center}

\vspace{0.5em}

{\fontsize{14}{17}\selectfont

\textbf{Execute query selectors (comparison selectors, logical selectors ) and list out the results on any collection.}

}

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture43.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Insert Values into collection}}\\

\begin{lstlisting}

> db.Products.insertMany([

{

\_id: "P1001",

name: "Wireless Mouse",

category: "Electronics",

price: 24.99,

stock: 50,

rating: 4.5,

tags: ["computer", "accessories"],

releaseDate: new Date("2022-03-15")

},

{

\_id: "P1002",

name: "Mechanical Keyboard",

category: "Electronics",

price: 89.99,

stock: 30,

rating: 4.7,

tags: ["gaming", "keyboard"],

releaseDate: new Date("2021-11-20")

},

{

\_id: "P1003",

name: "Bluetooth Headphones",

category: "Electronics",

price: 59.99,

stock: 0,

rating: 4.2,

tags: ["audio", "wireless"],

releaseDate: new Date("2023-01-05")

},

{

\_id: "P1004",

name: "Smart Watch",

category: "Wearables",

price: 199.99,

stock: 15,

rating: 3.9,

tags: ["fitness", "smart"],

releaseDate: new Date("2022-09-30")

},

{

\_id: "P1005",

name: "USB-C Cable",

category: "Accessories",

price: 12.99,

stock: 100,

rating: 3.5,

tags: ["cable", "charger"],

releaseDate: new Date("2020-05-10")

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture44.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Comparison Selectors}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Equality (\$eq)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products with exactly 4.5 rating}}\\

\begin{lstlisting}

> db.Products.find({ rating: { $eq: 4.5 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture53.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Inequality (\$ne)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products NOT in "Electronics" category}}\\

\begin{lstlisting}

db.Products.find({ category: { $ne: "Electronics" } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture54.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Greater Than (\$gt)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products priced above \$50}}\\

\begin{lstlisting}

> db.Products.find({ price: { $gt: 50 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture55.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Greater Than or Equal (\$gte)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// // Find products with stock >= 30}}\\

\begin{lstlisting}

> db.Products.find({ stock: { $gte: 30 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture56.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// Less Than (\$lt)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products released before 2022}}\\

\begin{lstlisting}

> db.Products.find({ releaseDate: { $lt: new Date("2022-01-01") } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture57.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Less Than or Equal (\$lte)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products with rating <= 4.0}}\\

\begin{lstlisting}

> db.Products.find({ rating: { $lte: 4.0 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture58.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// In Array (\$in)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products in specific categories}}\\

\begin{lstlisting}

> db.Products.find({ category: { $in: ["Wearables", "Accessories"] } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture59.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Not In Array (\$nin)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Exclude products with certain tags}}\\

\begin{lstlisting}

> db.Products.find({ tags: { $nin: ["gaming", "fitness"] } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture61.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{>> LOGICAL SELECTORS}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// AND (Implicit)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find electronic products with stock > 0}}\\

\begin{lstlisting}

> db.Products.find({ category: "Electronics", stock: { $gt: 0 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture62.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// OR (\$or)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products either cheap (<\$20) or highly rated (>=4.5)}}\\

\begin{lstlisting}

> db.Products.find({$or: [{ price: { $lt: 20 } },{ rating: { $gte: 4.5 } }]})

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture62.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// NOT (\$not)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find products NOT released in 2022}}\\

\begin{lstlisting}

> db.Products.find({ releaseDate: { $not: { $gte: new Date("2022-01-01"), $lt: new Date("2023-01-01") }}})

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture63.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// NOR (\$nor)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Exclude products that are cheap OR low-rated}}\\

\begin{lstlisting}

> db.Products.find({$nor: [{ price: { $lt: 30 } },{ rating: { $lt: 4.0 } }]})

\end{lstlisting}

\begin{center}

\includegraphics[width=0.65\textwidth]{Picture64.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{B) Execute query selectors (Geospatial selectors, Bitwise selectors ) and list out the results on any collection}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Create Collection}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert Values into the Collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture66.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Create and switch to FoodDeliveryDB}}\\

\begin{lstlisting}

>db.Restaurants.insertMany([

{

name: "Pizza Palace",

cuisine: "Italian",

location: {

type: "Point",

coordinates: [-73.9857, 40.7486] // Near Empire State Building

},

rating: 4.5

},

{

name: "Sushi Heaven",

cuisine: "Japanese",

location: {

type: "Point",

coordinates: [-73.9865, 40.7551] // Midtown Manhattan

},

rating: 4.7

},

{

name: "Burger Barn",

cuisine: "American",

location: {

type: "Point",

coordinates: [-74.0003, 40.7306] // West Village

},

rating: 4.2

},

{

name: "Taco Fiesta",

cuisine: "Mexican",

location: {

type: "Point",

coordinates: [-73.9928, 40.6934] // Brooklyn

},

rating: 4.0

},

{

name: "Curry House",

cuisine: "Indian",

location: {

type: "Point",

coordinates: [-73.9814, 40.7528] // Near Times Square

},

rating: 4.8

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture67.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Create Geospatial Index}}\\

\begin{lstlisting}

> db.Restaurants.createIndex({ location: "2dsphere" })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture68.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Geospatial Queries}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find Restaurants Near a Location (\$near)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find restaurants within 1km of Times Square}}\\

\begin{lstlisting}

> db.Restaurants.find({

location: {

$near: {

$geometry: {

type: "Point",

coordinates: [-73.9851, 40.7580] // Times Square

},

$maxDistance: 1000 // 1km in meters

}

}

}).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture69.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find Restaurants Within a Polygon (\$geoWithin)}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Define a polygon covering Midtown Manhattan}}\\

\begin{lstlisting}

> db.Restaurants.find({

location: {

$geoWithin: {

$geometry: {

type: "Polygon",

coordinates: [[

[-73.990, 40.750], // Vertex 1

[-73.980, 40.750], // Vertex 2

[-73.980, 40.760], // Vertex 3

[-73.990, 40.760], // Vertex 4

[-73.990, 40.750] // Close polygon

]]

}

}

}

}).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture71.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{c) BITWISE SELECTORS}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Create Collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture72.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert Values into the collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture73.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Get all users with read permission (bit 0 set)}}\\

\begin{lstlisting}

>db.userPermissions.find({ permissions: { $bitsAllSet: 1 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture74.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{2. Get users who can either write OR delete (bit 1 or 2 set)}}\\

\begin{lstlisting}

> db.userPermissions.find({ permissions: { $bitsAnySet: [1, 2] } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture75.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{3. Get non-admin users (bit 3 is clear)}}\\

\begin{lstlisting}

> db.userPermissions.find({ permissions: { $bitsAllClear: 8 } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture76.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{4.Get users who can read and write (bit 0 and 1 set)}}\\

\begin{lstlisting}

> db.userPermissions.find({ permissions: { $bitsAllSet: [0, 1] } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture77.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{5.Get users with at least one permission missing (not all permissions)}}\\

\begin{lstlisting}

>db.userPermissions.find({ permissions: { $bitsAnyClear: [0, 1, 2, 3] } })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture78.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

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\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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\textbf{\underline{EXPERIMENT 4:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{Create and demonstrate how projection operators (\$, \$elematch and \$slice) would be used in the MongoDB..}

}

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{center}

\includegraphics[width=\textwidth]{Picture45.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert Values into the Collection}}\\

\begin{lstlisting}

> db.Movies.insertMany([

{

title: "Inception",

director: "Christopher Nolan",

cast: [

{ actor: "Leonardo DiCaprio", role: "Cobb" },

{ actor: "Joseph Gordon-Levitt", role: "Arthur" },

{ actor: "Ellen Page", role: "Ariadne" }

],

ratings: [

{ source: "IMDb", score: 8.8 },

{ source: "Rotten Tomatoes", score: 87 },

{ source: "Metacritic", score: 74 }

]

},

{

title: "The Dark Knight",

director: "Christopher Nolan",

cast: [

{ actor: "Christian Bale", role: "Batman" },

{ actor: "Heath Ledger", role: "Joker" },

{ actor: "Aaron Eckhart", role: "Harvey Dent" }

],

ratings: [

{ source: "IMDb", score: 9.0 },

{ source: "Rotten Tomatoes", score: 94 },

{ source: "Metacritic", score: 84 }

]

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture46.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{>> Projection Operators:-}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{1. The \$ Projection Operator: used to project the first matching element from an array of embedded documents.}}\\

\begin{lstlisting}

> db.Movies.find({ title: "Inception", "cast.actor": "Leonardo DiCaprio" },{ "cast.$": 1 }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture47.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using Aggregation:}}\\

\begin{lstlisting}

> db.Movies.aggregate([

{ $match: { title: "Inception", "cast.actor": "Leonardo DiCaprio" } },

{ $project: { matchedCast: "$cast" } }

]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture60.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{2.The \$elemMatch Projection Operator: used to project the first matching element from an array based on specified criteria.}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find "The Dark Knight" and project ratings with score > 90:}}\\

\begin{lstlisting}

> db.Movies.find(

{ title: "The Dark Knight" },

{ ratings: { $elemMatch: { score: { $gt: 90 } } } }

).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture70.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{3. \$slice Projection Operator: used to include a subset of the array field.}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find "Inception" and project first 2 cast members:}}\\

\begin{lstlisting}

> db.Movies.find({ title: "Inception" },{ cast: { $slice: 2 } }).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture80.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

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\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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\textbf{\underline{EXPERIMENT 5:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{Execute Aggregation operations (\$avg, \$min, \$max, \$push, \$addToSet etc.).}

}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{ students

encourage to execute several queries to demonstrate various aggregation operators:}}\\

\vspace{2em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{center}

\includegraphics[width=\textwidth]{Picture90.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert values into the collections}}\\

\begin{lstlisting}

> db.Orders.insertMany([

{

orderDate: new Date("2024-01-10"),

product: "Smartphone",

brand: "BrandX",

price: 799,

quantity: 2,

customer: "Alice",

paymentMethod: "Credit Card"

},

{

orderDate: new Date("2024-01-11"),

product: "Smartphone",

brand: "BrandY",

price: 899,

quantity: 1,

customer: "Bob",

paymentMethod: "PayPal"

},

{

orderDate: new Date("2024-01-12"),

product: "Headphones",

brand: "BrandZ",

price: 199,

quantity: 3,

customer: "Alice",

paymentMethod: "Credit Card"

},

{

orderDate: new Date("2024-01-13"),

product: "Tablet",

brand: "BrandX",

price: 349,

quantity: 1,

customer: "Charlie",

paymentMethod: "Debit Card"

},

{

orderDate: new Date("2024-01-14"),

product: "Headphones",

brand: "BrandZ",

price: 199,

quantity: 2,

customer: "Bob",

paymentMethod: "PayPal"

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture100.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{Aggregation Operations:}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{a. \$avg: Average Price by Product}}\\

\begin{lstlisting}

> db.Orders.aggregate([

{

$group: {

\_id: "$product",

averagePrice: { $avg: "$price" } }

}]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture110.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{b. \$min: Minimum Price by Brand}}\\

\begin{lstlisting}

> db.Orders.aggregate([{ $group: { \_id: "$brand", minPrice: { $min: "$price" } } }]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture120.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{c. \$max: Maximum Quantity Purchased by Customer}}\\

\begin{lstlisting}

> db.Orders.aggregate([{ $group: { \_id: "$customer", maxQuantity: { $max: "$quantity" } } ]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture130.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{d. \$push: List All Products by Payment Method}}\\

\begin{lstlisting}

> db.Orders.aggregate([{ $group: { \_id: "$paymentMethod", products: { $push: "$product" } // Includes duplicates} }]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture140.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{e. \$addToSet: Unique Products by Customer}}\\

\begin{lstlisting}

> db.Orders.aggregate([{ $group: { \_id: "$customer", uniqueProducts: { $addToSet: "$product" } } }]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture150.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{Combining Aggregation Operations:}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Average Order Value by Payment Method}}\\

\begin{lstlisting}

> db.Orders.aggregate([{$project: {

paymentMethod: 1,

orderValue: { $multiply: ["$price", "$quantity"] }

}},

{$group: {\_id: "$paymentMethod",avgOrderValue: { $avg: "$orderValue" } }

}]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture160.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

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\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\textbf{\underline{EXPERIMENT 6:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{Execute Aggregation Pipeline and its operations (pipeline must contain \$match, \$group, \$sort, \$project, \$skip etc. students encourage to execute several queries to demonstrate various aggregation operators))}}\\

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{center}

\includegraphics[width=\textwidth]{Picture170.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert values into the collections}}\\

\begin{lstlisting}

> db.hotels.insertMany([

{

name: "Grand Plaza",

city: "New York",

stars: 5,

amenities: ["pool", "spa", "gym", "restaurant"],

reviews: [

{ user: "Alex", rating: 5, comment: "Luxurious stay", date: ISODate("2023-05-15") },

{ user: "Beth", rating: 4, comment: "Great service", date: ISODate("2023-06-20") }

]

},

{

name: "Sunset Inn",

city: "Los Angeles",

stars: 4,

amenities: ["pool", "restaurant"],

reviews: [

{ user: "Charlie", rating: 3, comment: "Average experience", date: ISODate("2023-04-10") },

{ user: "Dana", rating: 5, comment: "Beautiful views", date: ISODate("2023-07-05") }

]

},

{

name: "Mountain View",

city: "Denver",

stars: 3,

amenities: ["gym", "restaurant"],

reviews: [

{ user: "Evan", rating: 4, comment: "Cozy rooms", date: ISODate("2023-03-12") },

{ user: "Fiona", rating: 2, comment: "Needs renovation", date: ISODate("2023-08-18") }

]

},

{

name: "Beach Resort",

city: "Miami",

stars: 4,

amenities: ["pool", "spa", "beach access"],

reviews: [

{ user: "George", rating: 5, comment: "Perfect vacation", date: ISODate("2023-09-01") },

{ user: "Hannah", rating: 4, comment: "Excellent location", date: ISODate("2023-02-14") }

]

},

{

name: "Urban Loft",

city: "Chicago",

stars: 3,

amenities: ["gym"],

reviews: [

{ user: "Ian", rating: 3, comment: "Basic but clean", date: ISODate("2023-01-30") },

{ user: "Julia", rating: 4, comment: "Good value", date: ISODate("2023-10-22") }

]

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture180.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{Aggregation Pipeline and its operations:

Execute Aggregation Pipeline and its operations (pipeline must contain match, group, sort, project, \$skip etc.)}}\\

\begin{lstlisting}

> db.hotels.aggregate([

{

$match: {

"city": "New York"

}

},

{

$unwind: "$reviews"

},

{

$group: {

\_id: "$name",

averageRating: { $avg: "$reviews.rating" },

totalReviews: { $sum: 1 },

starRating: { $first: "$stars" }

}

},

{

$sort: {

averageRating: -1

}

},

{

$project: {

\_id: 0,

hotelName: "$\_id",

stars: "$starRating",

averageRating: { $round: ["$averageRating", 2] },

totalReviews: 1

}

},

{

$skip: 0

}

]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture190.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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\textbf{\underline{EXPERIMENT 7:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{a. Find all listings with listing\\_url, name, address, host\\_picture\\_url in the listings And Reviews collection that have a host with a picture url}}\\

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{center}

\includegraphics[width=\textwidth]{Picture200.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert values into the collections}}\\

\begin{lstlisting}

> db.hotelListings.insertMany([

{

listing\_url: "http://travel.com/hotels/101",

name: "Luxury Resort",

address: {

street: "1 Beachfront Avenue",

city: "Miami",

state: "Florida",

country: "USA"

},

host: {

name: "John Smith",

picture\_url: "http://travel.com/hosts/john.jpg"

}

},

{

listing\_url: "http://travel.com/hotels/202",

name: "Downtown Hotel",

address: {

street: "500 Main Street",

city: "Chicago",

state: "Illinois",

country: "USA"

},

host: {

name: "Sarah Johnson",

picture\_url: ""

}

},

{

listing\_url: "http://travel.com/hotels/303",

name: "Mountain Lodge",

address: {

street: "100 Alpine Way",

city: "Denver",

state: "Colorado",

country: "USA"

},

host: {

name: "Mike Brown",

picture\_url: "http://travel.com/hosts/mike.jpg"

}

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture210.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Query to Find Listings with Host Picture URLs: (use \$exists)}}\\

\begin{lstlisting}

> db.hotelListings.find(

{

"host.picture\_url": { $exists: true, $ne: "" }

},

{

listing\_url: 1,

name: 1,

address: 1,

"host.picture\_url": 1,

\_id: 0

}

).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture220.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{b. Using Restaurant collection write a query to display reviews summary.}}|\\

\noindent{\fontsize{14}{17}\selectfont\textbf{//Create Collection}}\\

\begin{center}

\includegraphics[width=\textwidth]{Picture230.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Insert Values into Collection}}\\

\begin{lstlisting}

> db.restaurants.insertMany([

{

restaurant\_id: 1,

name: "Italian Bistro",

cuisine: "Italian",

average\_price: 40,

reviews: [

{ user: "Alex", rating: 5, comment: "Amazing pasta!", date: ISODate("2023-01-15") },

{ user: "Beth", rating: 4, comment: "Great service", date: ISODate("2023-02-20") },

{ user: "Chris", rating: 3, comment: "Good but pricey", date: ISODate("2023-03-10") }

]

},

{

restaurant\_id: 2,

name: "Sushi Palace",

cuisine: "Japanese",

average\_price: 60,

reviews: [

{ user: "Dana", rating: 5, comment: "Best sushi ever!", date: ISODate("2023-04-05") },

{ user: "Evan", rating: 2, comment: "Not fresh", date: ISODate("2023-05-12") }

]

},

{

restaurant\_id: 3,

name: "Burger Joint",

cuisine: "American",

average\_price: 15,

reviews: [

{ user: "Fiona", rating: 4, comment: "Great burgers", date: ISODate("2023-06-18") },

{ user: "George", rating: 4, comment: "Good value", date: ISODate("2023-07-22") },

{ user: "Hannah", rating: 5, comment: "Awesome fries", date: ISODate("2023-08-30") }

]

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture240.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{// Query to Display Restaurant Reviews Summary}}\\

\begin{lstlisting}

> db.restaurants.aggregate([

{

$unwind: "$reviews"

},

{

$group: {

\_id: {

name: "$name",

cuisine: "$cuisine"

},

totalReviews: { $sum: 1 },

averageRating: { $avg: "$reviews.rating" },

minRating: { $min: "$reviews.rating" },

maxRating: { $max: "$reviews.rating" },

latestReview: { $last: "$reviews.date" }

}

},

{

$project: {

\_id: 0,

restaurant: "$\_id.name",

cuisine: "$\_id.cuisine",

totalReviews: 1,

averageRating: { $round: ["$averageRating", 2] },

ratingRange: {

min: "$minRating",

max: "$maxRating"

},

daysSinceLastReview: {

$divide: [

{ $subtract: [new Date(), "$latestReview"] },

1000 \* 60 \* 60 \* 24

]

}

}

},

{

$sort: {

averageRating: -1

}

}

]).pretty()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture250.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

\vspace{0.5pt}

\begin{center}

\renewcommand{\arraystretch}{1.5} % More spacing between rows

\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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\fontsize{18}{20}\selectfont

\textbf{\underline{EXPERIMENT 8:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{a. Demonstrate creation of different types of indexes on collection (unique, sparse, compound and multikey indexes)}}\\

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{lstlisting}

> db.createCollection('users')

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture260.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Insert values into the collections}}\\

\begin{lstlisting}

> db.users.insertMany([

{

username: "alice123",

email: "alice@example.com",

age: 28,

interests: ["photography", "hiking"],

last\_login: new Date("2023-05-15")

},

{

username: "bob456",

email: "bob@example.com",

age: 32,

interests: ["gaming", "programming"],

last\_login: new Date("2023-06-20")

},

{

username: "charlie789",

age: 25,

interests: ["reading"],

last\_login: new Date("2023-04-10")

},

{

username: "david101",

email: "david@example.com",

age: 40,

last\_login: new Date("2023-07-01")

},

{

username: "eve202",

email: "eve@example.com",

age: 22,

interests: ["music", "travel"],

last\_login: new Date("2023-03-12")

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture270.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{1. Unique Index on Email}}\\

\begin{lstlisting}

> db.users.createIndex({ email: 1 }, { unique: true })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture280.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{2. Sparse Index on Email}}\\

\begin{lstlisting}

> db.users.createIndex({ email: 1 }, { sparse: true })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture290.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{3. Compound Index on Age and Last Login}}\\

\begin{lstlisting}

> db.users.createIndex({ age: 1, last\_login: -1 })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture300.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{4. Multikey Index on Interests (Array Field)}}\\

\begin{lstlisting}

> db.users.createIndex({ interests: 1 })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture310.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{5. View All Indexes}}\\

\begin{lstlisting}

> db.users.getIndexes()

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture320.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{b. Query Optimization with Indexes on "posts" Collection}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Inserting values into the collection}}\\

\begin{lstlisting}

> db.createCollection('posts')

> db.posts.insertMany([

{

title: "My Vacation",

content: "Had a great time in Hawaii...",

tags: ["travel", "vacation"],

views: 1500,

created\_at: new Date("2023-01-10")

},

{

title: "Tech Review",

content: "The new smartphone is amazing...",

tags: ["technology", "review"],

views: 3200,

created\_at: new Date("2023-02-15")

},

{

title: "Cooking Tips",

content: "Here's my secret recipe...",

tags: ["food", "cooking"],

views: 800,

created\_at: new Date("2023-03-05")

},

{

title: "Fitness Journey",

content: "My 6-month transformation...",

tags: ["fitness", "health"],

views: 4500,

created\_at: new Date("2023-04-20")

},

{

title: "Book Recommendations",

content: "Here are my top 5 books...",

tags: ["reading", "books"],

views: 1200,

created\_at: new Date("2023-05-12")

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture330.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{1. Run Query Without Index}}\\

\begin{lstlisting}

> db.posts.find({

tags: "technology",

views: { $gt: 3000 }

}).explain("executionStats")

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture340.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{2. Create Compound Index on Tags and Views}}\\

\begin{lstlisting}

> db.posts.createIndex({ tags: 1, views: 1 })

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture350.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{3. Re-run Query with Index}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Check number of documents examined}}\\

\begin{lstlisting}

> db.posts.find({

tags: "technology",

views: { $gt: 3000 }

}).explain("executionStats").executionStats.totalDocsExamined

\end{lstlisting}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Check execution time estimate}}\\

\begin{lstlisting}

> db.posts.find({

tags: "technology",

views: { $gt: 3000 }

}).explain("executionStats").executionStats.executionTimeMillisEstimate

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture360.png}\\

\includegraphics[width=\textwidth]{Picture370.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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\textbf{\underline{EXPERIMENT 9:}}\\

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{\fontsize{14}{17}\selectfont

\textbf{a. Develop a query to demonstrate Text search using books data collection for a given word)}}\\

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{lstlisting}

> db.createCollection('books')

\end{lstlisting}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Verify the documents loaded for the collection}}\\

\begin{lstlisting}

> db.books.countDocuments() // Returns number of documents imported

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture380.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating Text Index}}\\

\begin{lstlisting}

> db.books.createIndex({title: "text", keywords: "text"})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture390.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Perform a Text Search Query}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Search for books containing "harry" in title or keywords}}\\

\begin{lstlisting}

> db.books.find({$text: {$search: "harry"}})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture400.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Search for books containing "fantasy" in keywords}}\\

\begin{lstlisting}

> db.books.find({$text: {$search: "fantasy"}})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture410.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Phrase Search}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Search for exact phrase "Harry Potter"}}\\

\begin{lstlisting}

> db.books.find({$text: {$search: "\"Harry Potter\""}})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture420.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{b.Develop queries to illustrate excluding documents with certain words and phrases}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Excluding Specific Words}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find mystery books excluding horror}}\\

\begin{lstlisting}

> db.books.find({

$text: {$search: "mystery -horror"},

published\_year: 2020

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture430.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Excluding Phrases}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Find books about "dark" but not "dark tower" series}}\\

\begin{lstlisting}

> db.books.find({$text: {$search: 'dark -"dark tower"'}})

\end{lstlisting}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Alternative syntax with escaped quotes}}\\

\begin{lstlisting}

> db.books.find({$text: {$search: "dark -\\\"dark tower\\\""}})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture440.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\textbf{\underline{EXPERIMENT 10:}}\\

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\textbf{Develop an aggregation pipeline to illustrate Text search on Catalog data collection.}}\\

\vspace{1em}

{\fontsize{14}{17}\selectfont

\noindent{\fontsize{14}{17}\selectfont\textbf{Solution:}}\\

}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Creating the Collection}}

\begin{lstlisting}

> db.createCollection('books')

\end{lstlisting}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Verify the documents loaded for the collection}}\\

\begin{lstlisting}

> db.books.countDocuments() // Returns number of documents imported

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture450.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{// Projection Projections}}\\

\begin{lstlisting}

> db.books.aggregate([{ $project: { year: 1 } }])

\end{lstlisting}

\begin{center}

\includegraphics[width=0.75\textwidth]{Picture460.png}\\

\end{center}

\newpage

\noindent{\fontsize{14}{17}\selectfont\textbf{// Including specific fields}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Using 1/0 syntax}}\\

\begin{lstlisting}

> db.books.aggregate([

{ $project: { year: 1, genre: 1, \_id: 0 } }])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture470.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{// Using field path syntax}}\\

\begin{lstlisting}

> db.books.aggregate([

{ $project: { year: "$year", genre: "$genre", \_id: 0 } }])

\end{lstlisting}

\begin{center}

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\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{//Projection with Limit}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{// Project year and genre, then limit to 5 results}}\\

\begin{lstlisting}

> db.books.aggregate([

{ $project: { year: "$year", genre: "$genre", \_id: 0 } },

{ $limit: 5 }])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture490.png}\\

\end{center}

\noindent{\fontsize{14}{17}\selectfont\textbf{1. Text Search Aggregation Pipeline}}\\

\noindent{\fontsize{14}{17}\selectfont\textbf{//Creating Text Index}}\\

\begin{lstlisting}

> db.books.createIndex({

title: "text",

keywords: "text"

}, {

name: "book\_text\_search",

default\_language: "english"

})

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture50.png}\\

\end{center}

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\begin{lstlisting}

> db.Books.aggregate([

{

$match: {

$text: { $search: "adventure -history" }, // Finds "adventure" but excludes "history"

year: { $gte: 1900 } // Only books from 1900 onwards

}

},

{

$group: {

\_id: "$genre",

avgRating: { $avg: "$rating" },

count: { $sum: 1 },

bookTitles: { $push: "$title" }

}

},

{

$sort: { avgRating: -1 } // Highest rated first

},

{

$project: {

\_id: 0,

genre: "$\_id",

averageRating: { $round: ["$avgRating", 2] },

numberOfBooks: "$count",

sampleBooks: { $slice: ["$bookTitles", 2] } // Show first 2 book titles

}

},

{

$limit: 5

}

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture51.png}\\

\end{center}

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\noindent{\fontsize{14}{17}\selectfont\textbf{2. Multi-Stage Aggregation with Skip}}\\

\begin{lstlisting}

>db.books.aggregate([

{ $match: {

$text: { $search: "classic -religion" },

year: { $lt: 2000 }

}},

{ $group: {

\_id: "$author",

books: { $push: "$title" },

avgRating: { $avg: "$rating" }

}},

{ $sort: { avgRating: -1 } },

{ $project: {

author: "$\_id",

numberOfBooks: { $size: "$books" },

averageRating: { $round: ["$avgRating", 2] }

}},

{ $skip: 1 },

{ $limit: 3 }

])

\end{lstlisting}

\begin{center}

\includegraphics[width=\textwidth]{Picture52.png}\\

\end{center}

{\fontsize{14}{17}\selectfont\textbf{Evaluation}}

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\begin{tabular}{|p{3in}|p{3in}|}

\hline

\textbf{Marks Obtained} & \textbf{Teacher's Signature} \\

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\end{tabular}

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