Topic	Structuring before Coding	
Class Description	**Students design a form using p5 dom to allow players to login and log the player names to the database. The gamestate and the player count are also logged. Students use the OOPs programming style to write the code.**	
Class	**C36**	
Class time	**45 mins**	
Goal	● Create a form to log the players' name in the game. ● Update playerCount and gameState in the database. ● Use OOPs programming style.	
Resources Required	● Teacher Resources ○ Laptop with internet connectivity ○ Earphones with mic ○ Notebook and pen ● Student Resources ○ Laptop with internet connectivity ○ Earphones with mic ○ Notebook and pen	
Class structure	**Warm Up** **Teacher-led Activity** **Student-led Activity** **Wrap up**	**5 mins** **5 min** **25 min** **5 mins**

WARM UP SESSION - 15mins

Teacher starts slideshow from slides 1 to 15

Refer to speaker notes and follow the instructions on each slide.

Activity details	Solution/Guidelines
How are you doing? Are you excited to learn something new?	**ESR**:Thanks, yes I am excited about it.

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Run the presentation from slide 1 to slide 9. **Following are the warm up session deliverables:** ● Connecting students to the previous class. ● Warm Up Quiz Session	Click on the slide show tab and present the slides.
QnA Session	
Question	**Answer**
Which instructuction is used to refer to the location of the database value we care about? A. .on() B. .set() C. .ref() D. None	**C**
What can be used to store information about the game objects in real time so as to make the game operate synchronously in different browsers? A. Database server B. HDD C. Google Drive D. Flash Drive	**A**
Continue the warm up session	
Activity details	**Solution/Guidelines**
Run the presentation from slide 10 to slide 15 to set the problem statement. **Following are the warm up session deliverables:** ● Introduce students to the coding environment - Workspace, blocks and output.	Narrate the story by using hand gestures and voice modulation methods to bring in more interest in students.

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• Steps to write and run the structured and unstructured code.		
Teacher ends slideshow		
TEACHER-LED ACTIVITY - 8mins		
Teacher starts slideshow from slides 16 to 23 Refer to speaker notes and follow the instructions on each slide.		
<u>CHALLENGE</u> • **Use p5 dom to create a login form for players to log in.**		
Step 2: Teacher-led Activity (5 min)	We need to create some sort of a form where different users can log in their name and get into the game. Everytime a new user logs in, a new Player should be created. We also need to keep account of the number of players in the game and the game state. For example, when the game state is 0 (WAIT), we want the players to see the login form where they register their name as players. Let's say we make a 4-player game. When the number of registered players reaches 4, we want the game state to become 1 (PLAY). When the game state changes to 1, we would like the game to start. Any ideas on how to do this?	**ESR:** varied

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	There are a number of ways in which we can go about doing this. We can start writing the code immediately. But good programmers, before writing code, think about how to structure their code. Which programming style are we using in our codes so far?	**ESR:** OOPs - object oriented style
	For this small part of our game, where are we asking the players to login, what are the different objects that can be in our game? What will their properties and functions be?	**ESR:** varied

	We need to have at least 3 objects-
	
	1. **Form:** Form should contain the input box and a button to log in.
	  - When the button is pressed, the player's name should be registered in the database and a new player should be created.
	2. **Player**: A new player object should be created every time a new user logs in. It should contain all the information about the player - name, position in the game etc.
	  - For now it can just have the name property. It should also be able to read and write player
		Student listens and asks questions.

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	information to the database - for example player count or player name. 3. **Game Object:** Game object should be able to hold the state of the game. It should be able to display form when the game state is 0(WAIT) or the game when the game state is 1(PLAY) or leaderboard when the game state is 2(END). ● For now, we will only consider the case when the game state is 0.	
	Now that we know how the basic structure of our program will be, it will become fairly easy to write our code! Without this structure, writing code can appear complex. With this guide in mind, why don't you start with the coding exercise. I will be guiding you in the exercise.	*Student shares the screen, fires up the editor and prepares to code.*
Teacher ends slideshow		
	Now it's your turn. Please share your screen with me.	
Teacher starts slideshow		
Run the presentation for slide 24 - 25 to set the student activity context.		

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Teacher ends slideshow		
• **Ask Student to press ESC key to come back to panel** • **Guide Student to start Screen Share** • **Teacher gets into Fullscreen**		
ACTIVITY • **Use p5 dom to create a login form for players to log in.**		
Step 3: Student-Led Activity (25 min)	*Guide the student to open the previous class project and use it as a boilerplate. The student can clear the sketch.js file.*	*Student opens the code from the previous class and clears the sketch.js file.* *Alternatively, the student can clone* ***Student Activity 1.***

	Let's modify our database.
	
	Guide the student to login to the console.firebase.google.com and modify the previous database to create a new database structure equivalent to the following:
	
	{
	gameState: 0,
	playerCount: 0,
	player1: {name: ""},
	player2: {name: ""},
	....
	}
	
	The firebase config files will remain the same since we are not changing the database.
		The student logs in to the firebase console and creates the database structure.

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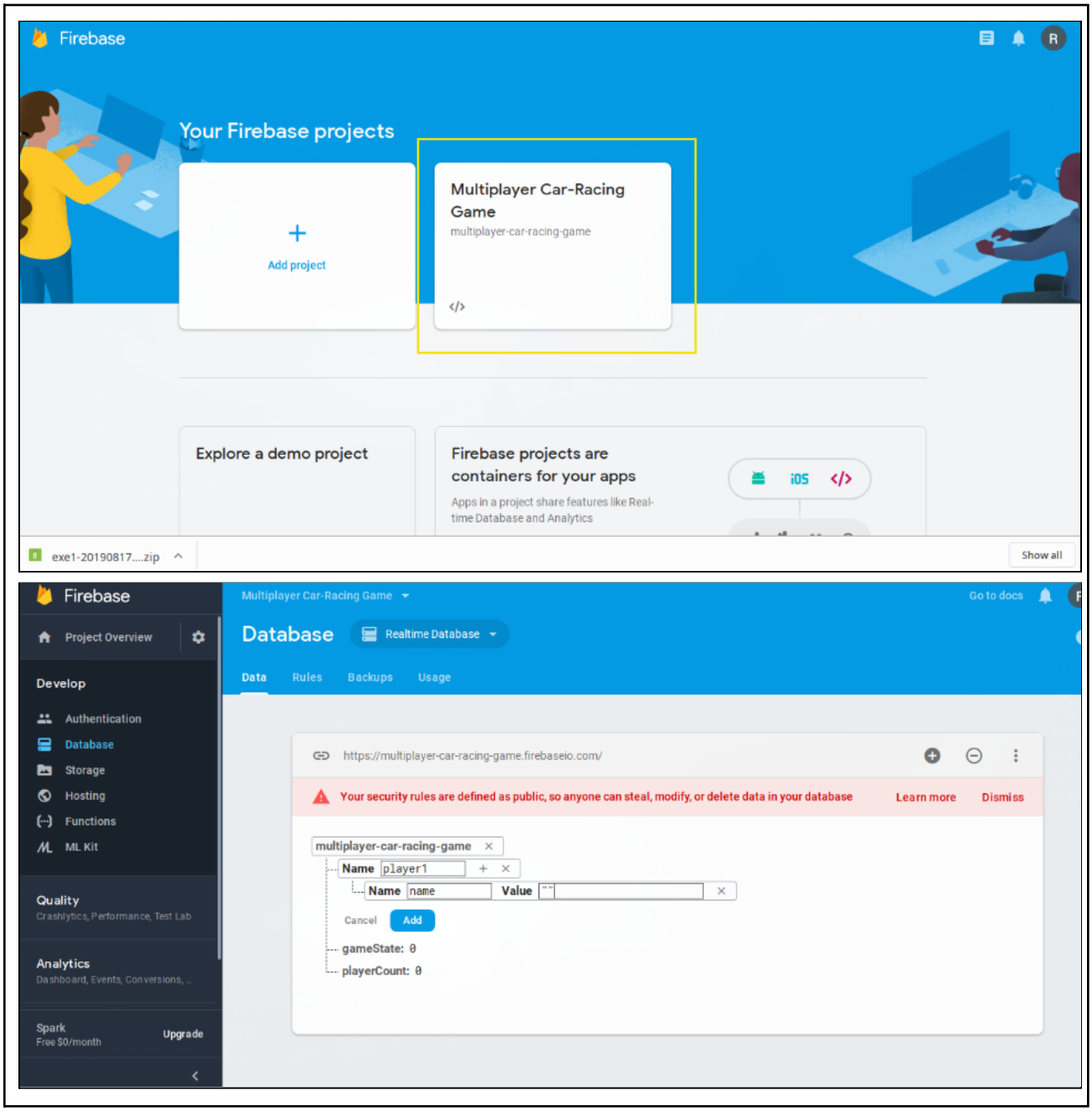

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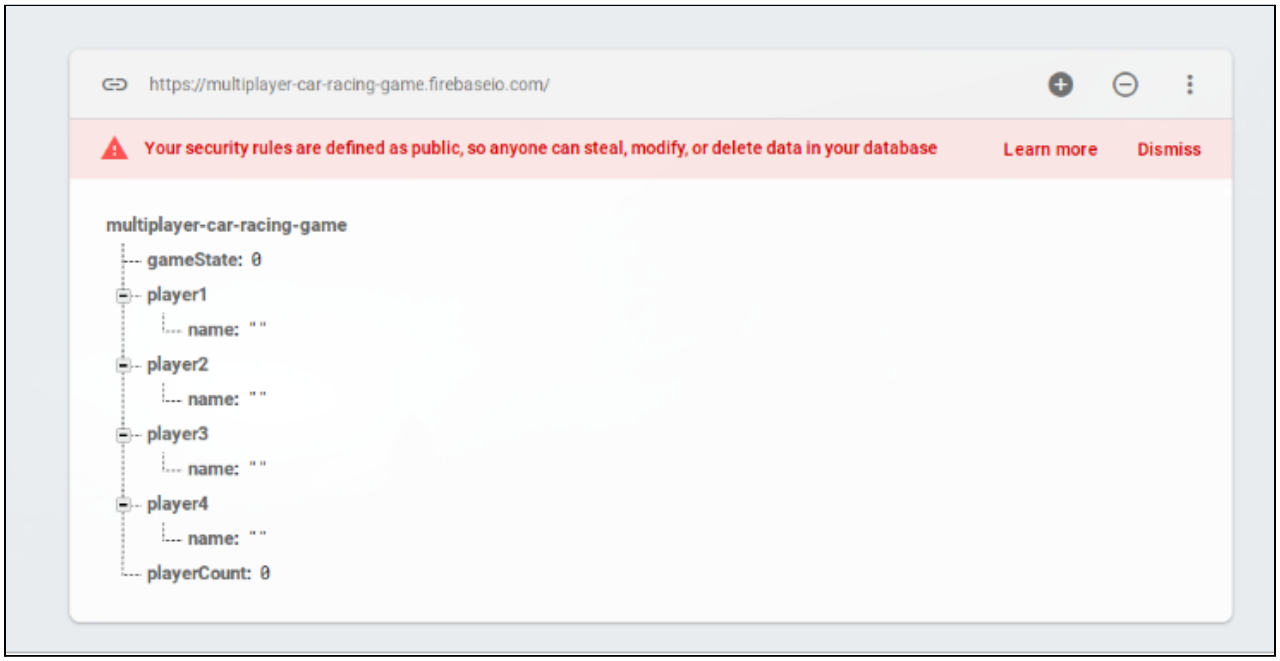

	Let's create a new folder in our directory called js. This will contain the blueprint of all the 3 objects in our game - Game, Form and Player. Let's create files for these and include them in the index.html file.	*Student creates a js folder inside the current working directory.* *The student then creates Game.js, Form.js and Player.js - where they will be creating the blueprints for these objects.* *The student includes these files in the index.html.*

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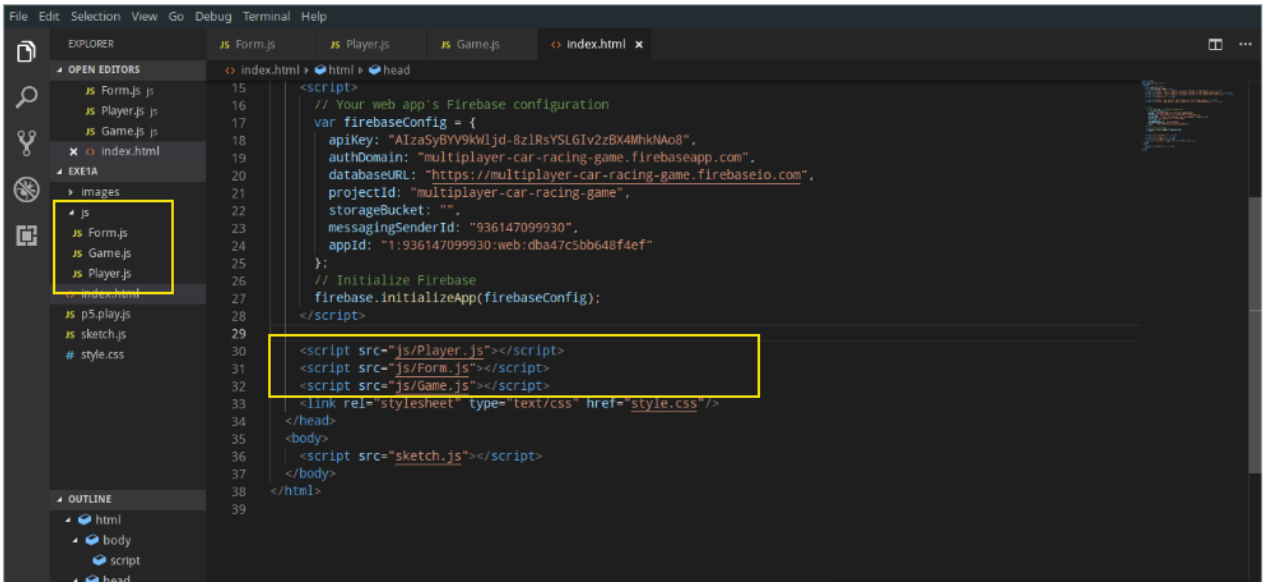
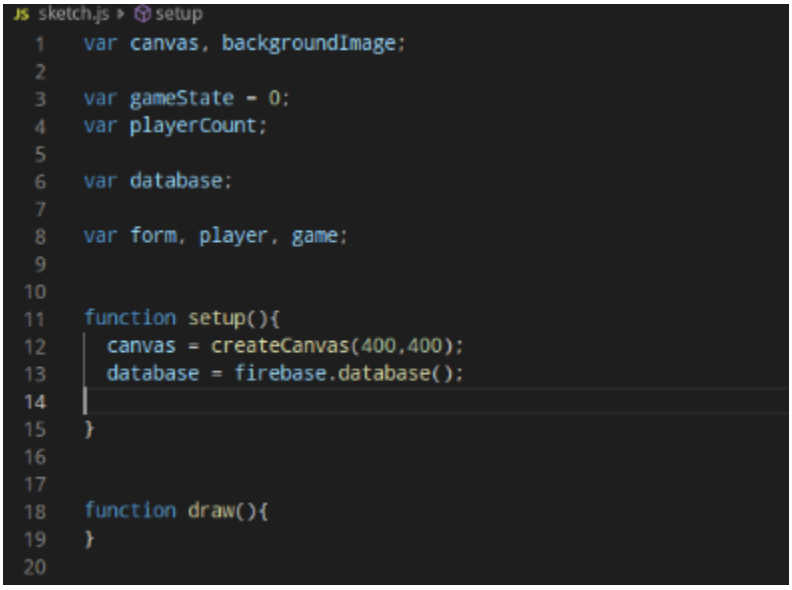


	Let's start with the sketch.js file and include all the global variables will be needing. *Guide the student to create the global variables used in the program, create a canvas and connect to the firebase database.*	*The student writes code in the sketch.js file as shown in the picture below.*



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	Let's write the Game class first. ***Note:*** *<u>Help the student write the code and then go through it to make sure the student understands the code.</u>* Our Game object should be able to read the gameState and update the gameState. It should also be able to start itself and display the game on the screen depending on the gameState. Constructor of a class is used to give properties to an object when it is created. For now, we can keep the constructor empty. Let's write functions inside the Game Class to getState and update the state. - getState() will simply read the game state from the database. - update(state) will update the gameState in the database to a value passed to it inside the parentheses. -> databaseReference.on() creates a listener which keeps listening to the gameState from the database. When the gameState is changed in the database, the function passed as an argument to it is executed. Note: Here the function is directly written inside the .on() listener.	*The student writes code for creating the Game class as shown in the image below.*

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	-> databaseReference.update() will update the database reference. Here "/" refers to the main database inside which gameState is created. We can also create a start() function which will start the game and display on the screen depending on the state of the game. For now, when the game State is 0, we want a form and a player object to be created. We want to display the form and get the playerCount. We will write code to create these objects even though the blueprint isn't defined yet. This is called writing code using abstraction. We will be writing code for these classes and creating these objects after this.	

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```
js ▸ Game.js ▸ Game ▸ getState
class Game {
  constructor(){}

  getState(){
    var gameStateRef  = database.ref('gameState');
    gameStateRef.on("value",function(data){
        gameState = data.val();
    })

  }

  update(state){
    database.ref('/').update({
      gameState: state
    });
  }

  start(){
    if(gameState === 0){
      player = new Player();
      player.getCount();
      form = new Form()
      form.display();
    }
  }
}
```

	Let's write the Form Class now. HTML is used to create any content like a form on a page. HTML is similar to markdown in some ways. An HTML contains elements which define the structure of a page. A simple html page contains: - head: where all the scripts and stylesheets for the page is added. - body: where all the content of the page is added. The body of an HTML page can contain several different types of elements: - h1, h2, h3: display headings of different sizes.	*Student listens and asks questions.*

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	- input: to collect input from the user. - button: to display a button. This model of an HTML page is called Document object Model (or DOM). We will be using the p5 Dom library to create the form. You can look at the reference of the P5 dom library on how it is used. (Teacher Activity 2)	
	We will keep the constructor in the Form class empty. Let's write a display() function which displays the form. *(Teacher asks students to refer to the p5 dom reference while writing code.)* We create a title for our game "Car Racing Game": - we create an h2 element. - we change the html content inside the element. - we position the title on the canvas. Similarly, we create the input and the button element. We position the input and the button element.	*The student writes the code in the display function for Form.*

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```
js ▸ Form.js ▸ Form ▸ display
class Form {
  constructor() {

  }

  display(){
    var title = createElement('h2')
    title.html("Car Racing Game");
    title.position(130, 0);

    var input = createInput("Name");
    var button = createButton('Play');
    var greeting = createElement('h3');

    input.position(130, 160);
    button.position(250, 200);


  }
}
```

	We want to greet the player when the player writes their name and logs in. We also want to update the playerCount and the player name in the database. button.mousePressed() can be used to trigger an action when a mouse button is pressed. It expects a function as an argument. Let's write the code to display a greeting and update the database when the button is pressed.	*Student writes the button.mousePressed() function and the function inside it as an argument.* *When the button is pressed, student writes code to-* *- hide the input and the buttons.* *- increase the playerCount.* *- update the playerCount and the player name in the database.* *- create an h2 element and use it to greet the player when the player has logged in.* *Note that player.update() or player.updateCount() are not defined yet - but the*

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		student can use it as an abstraction.

```
js ▸ Form.js ▸ Form ▸ display
class Form {
  constructor() {

  }

  display(){
    var title = createElement('h2')
    title.html("Car Racing Game");
    title.position(130, 0);

    var input = createInput("Name");
    var button = createButton('Play');
    var greeting = createElement('h3');

    input.position(130, 160);
    button.position(250, 200);

    button.mousePressed();

  }
}
```

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```
js ▸ Form.js ▸ Form ▸ display ▸ button.mousePressed() callback
class Form {
  constructor() {

  }

  display(){
    var title = createElement('h2')
    title.html("Car Racing Game");
    title.position(130, 0);

    var input = createInput("Name");
    var button = createButton('Play');
    var greeting = createElement('h3');

    input.position(130, 160);
    button.position(250, 200);

    button.mousePressed(function(){
      input.hide();
      button.hide();

      var name = input.value();

      playerCount+=1;
      player.update(name)
      player.updateCount(playerCount);

      greeting.html("Hello " + name )
      greeting.position(130, 160)
    });

  }
}
```

	Finally, let's write the code for the Player Class. We need to write a function getCount() to get the playerCount and updateCount() to update the playerCount in the database. We also need to update the player name in the database. For this, we need to create new entries in the database. We can do this using string concatenation. If the playerCount is 1,	*Student writes code for getCount(), updateCount() and update(name) as in the image below.*

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	we create a database entry for player1 and we set the name for it and so on.	

```
js ▸ JS Player.js ▸ Player
class Player {
  constructor(){}

  getCount(){
    var playerCountRef = database.ref('playerCount');
    playerCountRef.on("value",function(data){
      playerCount = data.val();
    })
  }

  updateCount(count){
    database.ref('/').update({
      playerCount: count
    });
  }

  update(name){
    var playerIndex = "player" + playerCount;
    database.ref(playerIndex).set({
      name:name
    });
  }
}
```

	Finally, let's add some code in our sketch.js file to create a new Game object, get the gameState and then start the game.	*The student adds the code to create a new Game object, get the game State and start the game as in the image below.*

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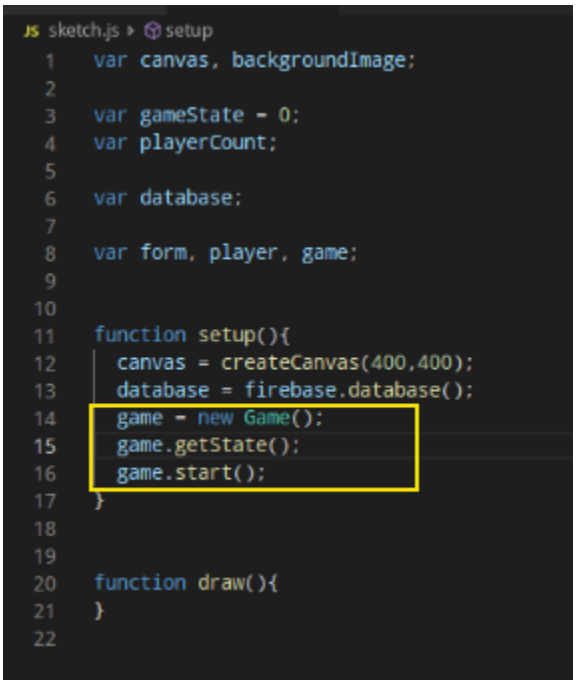		
	Let's test our code.	*The student runs the code using the 200 OK web server.* *- The student opens the link in different browsers.* *- Student adds the player Names and observes the changes in the firebase database.*

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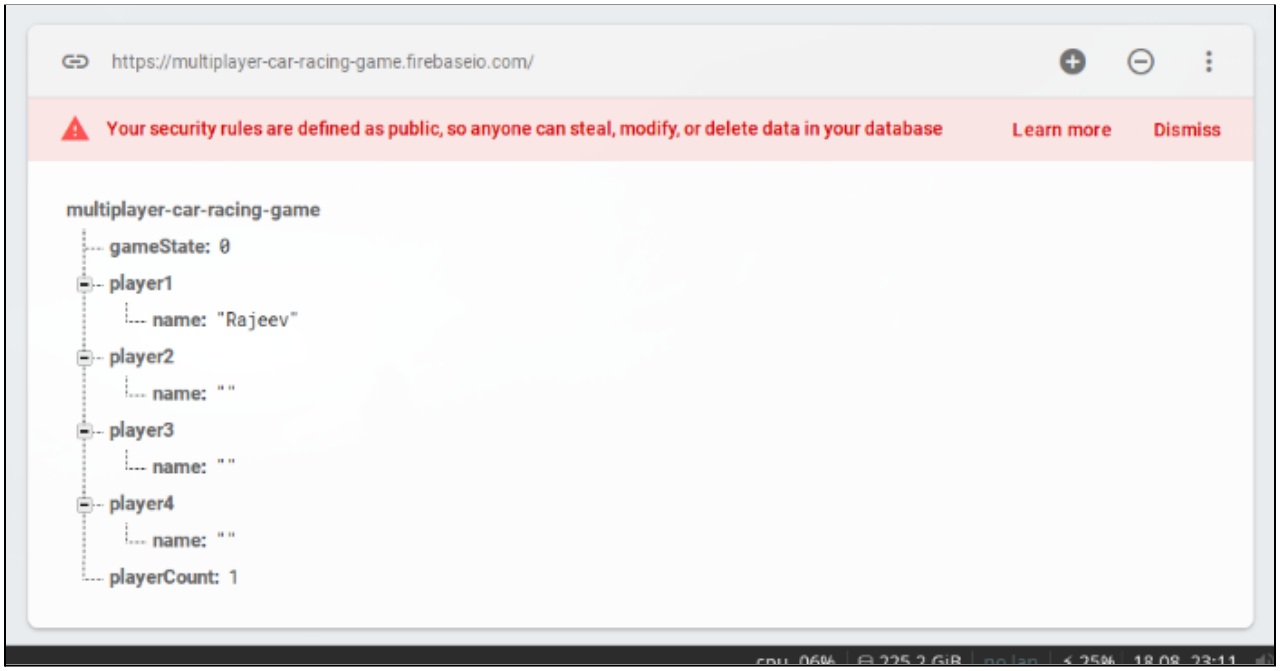

	Help the student debug any errors.	-

Teacher Guides Student to Stop Screen Share

WRAP UP SESSION - 5 Mins

FEEDBACK

- **Encourage the student to make reflection notes in markdown format.**
- **Complement the student for her/his effort in the class.**

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• **Review the content of the lesson.**	
Teacher starts slideshow from slides 26 to 35. Refer to speaker notes and follow the instructions on each slide.	
Activity details	**Solution/Guidelines**
Run the presentation from slide 26 to slide 35 **Following are the warm up session deliverables:** • **Revise the concepts** • **Wrap Up Quiz** • **Explain the facts and trivias** • **Project for the day** • **Next class challenge**	Guide the student to develop the project and share with us
Quiz time - Click on in-class quiz	
Question	**Answer**
Which object holds the state of the game (0:WAIT; 1: PLAY; 2:END)? A. Form Object B. Player Object C. Game Object D. None of these	**C**
Which language is used to create the content like a form on a page? A. JavaScript B. HTML C. CSS D. JAVA	**B**
Which object should be created every time a new player	**B**

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logs in? A. Form Object B. Player Object C. Game Object D. None of these		
End the quiz panel		
	You get a hats off. We have just created a form to register our players and their names in the game. We need to do a number of things more - we need to stop the player addition after 4 players, we need to change the game state to play, we need to create a car racing game between all the 4 players. We will be writing new code for all this in the coming classes.	*Make sure you have given at least 2 Hats Off during the class for:*   
<u>Project Name: Virtual Pet</u>	**Goal of the Project:** In Class 36, you created a form for players to log in, added input for a name, and a button to Play. You also created playerCount and gameState in the database. You learned to update gameState and player count to the database. In this project, you will have to apply what you have learned in the class and create a virtual pet game.	*Students engage with the teacher over the project.*

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	Story: Shreya really wants a pet. But nobody else in her family wants to bring a pet into the home. She wants to create a game where she can easily track the food stock (i.e., milk) she has and the time she feeds the dog. She should also be able to add food(milk bottles) to food stock when it is finished. Can you create a virtual pet game for Shreya? I am very excited to see your project solution and I know you will do really well. Bye Bye!	
Teacher Clicks ✖ End Class		
Teacher ends slideshow		
Additional Activities	*Encourage the student to write reflection notes in their reflection journal using markdown.* Use these as guiding questions: ● What happened today? - Describe what happened - Code I wrote ● How did I feel after the class?	*Student uses the markdown editor to write her/his reflection as a reflection journal.*

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	• What have I learned about programming and developing games? • What aspects of the class helped me? What did I find difficult?	

Activity	Activity Name	Links
Teacher Activity 1	Previous class code	https://github.com/whitehatjr/synchronousBallMovement
Teacher Activity 2	p5 dom reference	https://p5js.org/reference/#group-DOM
Teacher Activity 3	Final reference code	https://github.com/whitehatjr/carRacingStage0.5
Student Activity 1	Previous class code	https://github.com/whitehatjr/synchronousBallMovement
Student Activity 2	p5 dom reference	https://p5js.org/reference/#/libraries/p5.dom
Project Solution	Virtual Pet	https://github.com/priyapandey2020/vpcprogamethree6

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