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FINAL PROJECT  
SEMESTER MAY 2023



COMFYSTAY HOTEL

3D VIRTUAL TOUR

POLITEKNIK  
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This report is prepared to fulfill the requirement of  
CPP401 Final Project



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## PROJECT ACCEPTANCE PAPER

Hereby, I stated the following student

**DAFFA PRAMATHA RAMADHAN**

under programme of

*Bachelor of Information and Communication Technology (Hons)*

has accomplished his/her *Final Year Project* of the following title

**COMFYSTAY HOTEL 3D VIRTUAL TOUR**

*(project description is attached in this project paper)*

therefore, it can be accepted as the final project of the attached program.

Malaysia, 28 August 2023

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- c. The author's family who has provided moral and material support.
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Indonesia, Jakarta

Daffa Pramatha Ramadhan

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## ABSTRACT

The COVID-19 pandemic has changed the way we live, work and travel. During these challenging times, safety is of paramount importance, and virtual tours offer a solution to explore locations from the comfort of your home without any risk of exposure. A virtual tour provides a safe and convenient way to experience a location without having to leave your home, minimizing the contact with others and avoiding crowded places. With a virtual tour, you have the freedom to explore at your own pace and appreciate the details of the location without feeling rushed or crowded. Overall, virtual tours are an excellent alternative to physically visiting a location, offering an immersive experience that allows you to explore without any limitations, restrictions or safety concerns.



*Keywords: Virtual Tour, 3D Modeling, Unity Engine*

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## CHAPTER 1

### INTRODUCTION

#### 1.1 Introduction

The COVID-19 epidemic has significantly impacted the hospitality and tourist sectors by limiting travel and decreasing interest in it. In order to draw customers and provide novel experiences for individuals who can't visit their property physically, hotels are encouraged to develop innovative solutions.

The creation of virtual hotel 3D tours is a desirable option for hotels in this situation. With the help of this virtual tour, hotels can provide potential customers a more realistic and immersive experience, enabling them to view and get to know the location in-depth before choosing to make a reservation.

Online hotel Additional advantages of 3D tours for hotels include cost and time savings as well as improved operational efficiency. Without having to spend a lot of money on travel or advertising, virtual tours enable hotels to reach more potential customers from all over the world.

Technologies like Unity 3D provide developers practical and effective alternatives for creating virtual hotel 3D tours. This platform lets developers to produce interactive experiences with realistic visuals that are accessible on a variety of platforms, including desktop, mobile, and the web.

With the creation of virtual 3D hotel tours, lodging establishments can attract more visitors, improve the appeal of their properties, and lessen the effects of the COVID-19 pandemic on the hospitality and tourism sector as a whole.



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## 1.2 Problem Statement

According to the justification given, a number of statement issues are covered, including:

1. Limited physical access: Traditional physical tours restrict access due to geographical limitations, travel restrictions, and time constraints. This poses a challenge for individuals who cannot visit a location in person.
2. Issues with safety: After the COVID-19 pandemic or in other situations where the public's health is in danger, physical tours may not be safe due to the risk of getting viruses or other communicable diseases.
3. Time issues: Physical tours are usually time-limited, limiting how thoroughly visitors may explore and comprehend the location or facility being featured.
4. Experience inconsistency: Due to factors including the tour guides' expertise, linguistic restrictions, and crowded environments, the quality of physical tours may vary, giving participants a range of experiences.
5. Limited interactivity: Interactive components are typically absent from traditional tours, which inhibits visitors from actively engaging with their surroundings or gaining the most recent information and commentary.

## 1.3 Objective

In solving this problem, a new way of promoting hotels is needed so that it is more attractive and accessible to anyone, therefore a 3D virtual tour hotel is created to provide a new experience to prospective guests and make it easier for them to choose a hotel. It's also to increase accessibility for the potential guest. Physical tours often have a lot of limitation, such as geographical barriers or mobility constraints that can preventing them for experiencing certain locations or facilities. Virtual tours can solve this issue by enabling people to explore and engage with places they may not have the opportunity to visit in person. The potential guest can access the virtual tours platform regardless of their physical



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location. Another objective of virtual tours is to enhance safety, especially to faced the COVID-19 pandemic. Virtual tour can can enhance safety by enabling them to access the platform from the comfort and safety of their own homes. Virtual tours can also increase the experience for the potential guest. This virtual tour platform will offer consistent experience rather than physical tours that can be affected by multiple factors such as the tour guides, language barrier, physical or security restrictions, etc.

#### 1.4 System Scope

To implement this 3D virtual tour hotel project, the software that will be used is Blender/Maya as 3D object creation software and Unity 3D as the final software for compiling 3D objects that have been made to produce a 3D virtual tour hotel that can be used to make it easier for guests to see and enjoy the features of the hotel before making a reservation.

#### 1.5 Target User

The target of the 3D virtual tour hotel is people who want to make hotel reservations remotely due to distance constraints and limited access due to the previous Covid-19. However, this platform can also targeting other specific users such as travel agent, for hotel marketing team, etc.

- Traveller or Tourists
- Event Planners
- Travel Agents
- Sales or Marketing Team



## 1.6 Project Timeline

No	TASK	Jan				Feb				Mar				Apr				May				Jun				Jul				Aug							
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1	Concept	[Task 1: Concept - Active from Jan 1 to Apr 4]																																			
2	Material Collecting																	[Task 2: Material Collecting - Active from May 1 to May 4]																			
3	Design/Modeling																	[Task 3: Design/Modeling - Active from May 2 to May 5]																			
4	Assembly																	[Task 4: Assembly - Active from May 3 to May 6]				[Task 4: Assembly - Active from Jun 1 to Jun 4]															
5	Alpha Testing																	[Task 5: Alpha Testing - Active from Jun 2 to Jun 5]				[Task 5: Alpha Testing - Active from Jun 3 to Jun 6]															
6	Beta Testing																					[Task 6: Beta Testing - Active from Jun 4 to Jun 7]				[Task 6: Beta Testing - Active from Jun 5 to Jun 8]											
7	Documentation																									[Task 7: Documentation - Active from Jun 6 to Jun 9]				[Task 7: Documentation - Active from Jun 7 to Jun 10]							

Figure 1.1 Gantt Chart



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## CHAPTER 5

### CONCLUSION

#### 5.1 Introduction

The ComfyStay 3D Virtual Tour project is carried out due to response of COVID pandemic. With today world conditions, the need for tourism to do exploration from the safety of their homes arises. With virtual tour, potential guest doesn't need to do physical survey, thus enhancing their safety and comfort. This project develop using 3D technologies, this would be increasing user experience with consistent qualities of the environment. Other drawbacks regarding to physical tour such as time constraints, language barrier, inconsistent experience, safety concerns will also be reduced. The virtual tour can be accessed anytime and anywhere, have consistent experience, and offers safety to the potential guest. The virtual tour is an innovative and creative solution for today world conditions, especially for future modern world.

This project developed using Unity Engine technologies that offers wide range of usability. The object or assets creation done with Blender application. This is a perfect combination for creating powerfull projects with Unity technologies. The project is successfully addressed many concerns regarding to physical interactivity. Although it may have achieved it's main objectives, there's still room to do enhancement and improvements in order to increase the user experience. But particularly, this project aims to increasing safety and remote accessibilities in COVID-19 era.

#### 5.2 Problem Faced During System Implementation

There are several issues when the project is being develop that is require a lot of resource management and planning. Those issues are listed below:

- Limited hardware capabilities



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Due to limited capability of the gadget, technical issues are expected to be happening. Developing such realistic environment required a lot of hardware resource, therefore, lagging and performance issues sometimes happening. In order to make the development phase running smoothly, several configuration needs to be dismissed, thus reducing the graphics and realistic quality.

- Complexity of 3D assets creation  
Environment objects need to be set according to realistic environment. Due to lack of skills and hardware specification, object creation done in any possible way in order for the object to be finished. This step requires a lot of understanding the resource also manage it to developed the application more efficient and effective.
- Bug of code  
Application development through Unity Technologies requires coding to be run smoothly. There are several problem or errors happening during this development phase that was never been encountered before. Solving this problem a lot of research and reading coding documentation so the application can run without any failed features.

### 5.3 System Advantages

Despite any challenge encountered, ComfyStay 3D Virtual Tour project offers some advantages:

- Safety  
With health concerns happening in this era, virtual tour offers exploration inside the hotel without any physical contact or healthy risk.
- Accessibility  
ComfyStay 3D Virtual Tour can be accessed anytime and anywhere without any time and geographical limitations.
- Immersive Experience



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The project done with 3D modelling so the user or potential customer can appreciate and paying attention to the details of room or amenities provided by the hotel.

- **Consistent Experience**  
Unlike physical tour that will have different quality experience such as language barriers, inexperience staff tour guides, virtual tour will offer consistent experience to all users or customers.

#### 5.4 System Limitations

While ComfyStay finished according to the main objectives, it's still have limitations:

- **Hardware Constraints**  
This project done with limited hardware capabilities. As a result, there will be limitation on the complexity of the virtual surrounding and qualities of the objects.
- **Interactivity**  
The project offer interaction capabilities, but there are still many ways to enhance interaction experience such as user engagement, interaction with the hotel objects, even adding AI NPCs so the users can have interaction with computer character.
- **Realism**  
With the limitation of hardware specification, although it will be challenging, there is still room to enhance the realistic environment, such as graphics, objects quality, and the physics of application.

#### 5.5 Future Enhancements

Several enhancement can be applied in order for this ComfyStay 3D project to become better:



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- **Enhanced Graphics**  
Expanding more realistic or photogenic environment so it can offer higher quality of visual, this can only be done by upgrading the system hardware.
- **Expanding Interactivity**  
Adding more interaction features, such as talking, interact with other objects, or real-time information, could enhance the user experience.
- **Multiplatform Compatibility**  
This project can only be accessed through PC, if this project can offer many platforms, namely mobile devices or VR headsets, could enhance the accessibility and convenience.
- **User Feedback**  
Adding user feedback and user behaviour analytics could help the project to analyze the preference and the needs of potential guests. Therefore, it can enhance both virtual and real-life experience of the hotel.

## 5.6 Conclusion

In conclusion, ComfyStay 3D Virtual Tour project is carried out due to the response of health issues in the era of COVID-19. During this era, physical activities and hospitalities industries change it's behaviour. Physical interaction might still be happening but limited. This project is such an innovation in this era, by offering the virtual experience without leaving homes, thus reducing worries about healthy issues while being exposed to physical interaction.

The ComfyStay project development experience numerous and different types of constraints, but the project still reached it's main objectives. This type of virtual tour using 3D modelling offer better experience than just using 360-degree camera. Interactivity between objects and the experience user can get is expanded. Users or potential customers



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still can feel the realistic experience of the environment with detailed objects. Every part or corners of the surrounding can be observed to the smallest details, thus increasing the immersive experience. Virtual tour also offer consistent experience that will not affect when users or potential guests doing physical tour namely; by language, qualities of staff tour guides, limited time or places, etc. Thus, this will enhance the convenience, safety, quality, any other experience from the virtual tour.

Further enchancement can be applied in order to increase the project qualities. Increasing the graphics quality by upgrading developer hardware to enhance visual experience. Adding interaction between objects or even adding AI NPCs to enhance user interactivity. Develop multi-platform so it can be accessed by wide different typs of platform, incereasing the user convenience. Lastly, adding user feedback so the project can be changed according to users or potential guests preferences.

In brief, ComfyStay 3D Virtual Tour project is develop to prove to keep adapt to different technologies evolution in an era where technological advancement keep changing. This project gives a glimpse of how the future of hospitalities looks like as the world and it's technologies continues to evolve. ComfyStay 3D Virtual Tour will absolutely offer better user experience in the future.



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## APPENDICES

### Appendix A – Coding Script

```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4
5 public class BGM : MonoBehaviour
6 {
7     private static BGM backgroundMusic;
8
9     private void Awake ()
10    {
11        if(backgroundMusic == null)
12        {
13            backgroundMusic = this;
14        }
15        else
16        {
17            Destroy(gameObject);
18        }
19    }
20 }
```

**Background Music Script** – This script for handling the background music. When changing scene, music object will be shut off (destroyed)

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```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.UI;
5
6 public class Interaction : MonoBehaviour
7 {
8     public GameObject interactionUI;
9     public Text interactionText;
10    public string interactionMessage = "Press [E] to interact";
11    public GameObject roomSelection;
12
13    public FirstPersonLook mouseLookScript;
14
15    private bool isInRange = false;
16
17    private void OnTriggerEnter(Collider other)
18    {
19        if (other.CompareTag("Player"))
20        {
21            isInRange = true;
22            interactionText.text = interactionMessage;
23            interactionUI.SetActive(true);
24        }
25    }
26
27    private void OnTriggerExit(Collider other)
28    {
29        if (other.CompareTag("Player"))
30        {
31            isInRange = false;
32            interactionUI.SetActive(false);
33        }
34    }
35
36    private void Update()
37    {
38        if(isInRange && Input.GetKeyDown(KeyCode.E))
39        {
40            roomSelection.SetActive(true);
41            Time.timeScale = 0f;
42            Cursor.lockState = CursorLockMode.None;
43            Cursor.visible = true;
44
45            interactionUI.SetActive(false);
46            interactionText.text = "";
47
48            mouseLookScript.mouseLookEnabled = false;
49            AudioListener.pause = true;
50        }
51    }
52
53    public void CloseRoomSelection()
54    {
55        roomSelection.SetActive(false);
56        Time.timeScale = 1f;
57        Cursor.lockState = CursorLockMode.Locked;
58        Cursor.visible = false;
59
60        interactionUI.SetActive(true);
61        interactionText.text = interactionMessage;
62
63        mouseLookScript.mouseLookEnabled = true;
64        AudioListener.pause = false;
65    }
66
67 }
68
```





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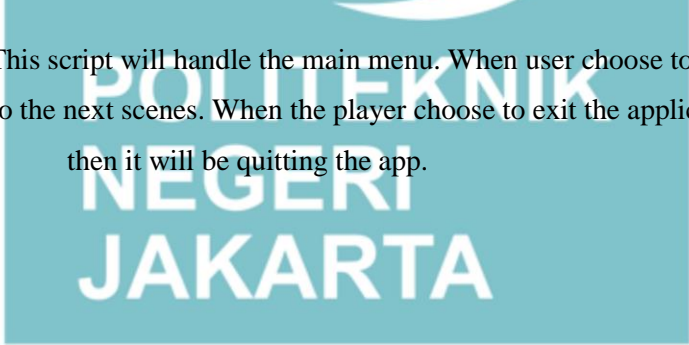
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**Object Interaction Script** – This script is to handle the object interaction. So, when the user move close to the object, interaction message will appear, after the user respond according to the message or Pressing [E] on keyboard, an interaction UI will appear.

Lastly, the user can choose the room they want to explore.

```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5
6 public class MainMenu : MonoBehaviour
7 {
8
9     public void Enter ()
10    {
11        SceneManager.LoadScene(SceneManager.GetActiveScene().buildIndex + 1);
12    }
13
14    public void QuitGame ()
15    {
16        Debug.Log ("QUIT!");
17        Application.Quit();
18    }
19 }
20
```

**Main Menu Script** – This script will handle the main menu. When user choose to entry, the scene will change to the next scenes. When the player choose to exit the application, then it will be quitting the app.





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```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5 using UnityEngine.UI;
6
7
8 public class PauseMenu : MonoBehaviour
9 {
10     public static bool GameIsPaused = false;
11
12     public GameObject pauseMenuUI;
13
14     public FirstPersonLook mouseLookScript;
15
16     // Update is called once per frame
17     void Update()
18     {
19         if (Input.GetKeyDown(KeyCode.Escape))
20         {
21             if (GameIsPaused)
22             {
23                 Resume();
24             } else
25             {
26                 Pause();
27             }
28         }
29     }
30
31     public void Resume()
32     {
33         pauseMenuUI.SetActive(false);
34         Time.timeScale = 1f;
35         GameIsPaused = false;
36         Cursor.lockState = CursorLockMode.Locked;
37         Cursor.visible = false;
38
39         mouseLookScript.mouseLookEnabled = true;
40         AudioListener.pause = false;
41     }
42
43     void Pause()
44     {
45         pauseMenuUI.SetActive(true);
46         Time.timeScale = 0f;
47         GameIsPaused = true;
48         Cursor.lockState = CursorLockMode.None;
49         Cursor.visible = true;
50
51         mouseLookScript.mouseLookEnabled = false;
52         AudioListener.pause = true;
53     }
54 }
55
56 }
```



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**Pause Menu Script** – This script will handle the pause menu. When the user choose to pause the application using [Esc] button, every application feature will be stopped, such as player movement, music, and mouse look perspective.

```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.SceneManagement;
5 using UnityEngine.UI;
6
7 public class changescenes : MonoBehaviour
8
9 {
10
11     public List<string> sceneNames;
12
13     public void LoadScene(int index)
14     {
15         if (index >= 0 && index < sceneNames.Count)
16         {
17             SceneManager.LoadScene(sceneNames[index]);
18             Time.timeScale = 1f;
19             AudioListener.pause = false;
20         }
21         else
22         {
23             Debug.LogWarning("Invalid scene index: " + index);
24         }
25     }
26
27     public void LoadSceneByName(string sceneNames)
28     {
29         SceneManager.LoadScene(sceneNames);
30         Time.timeScale = 1f;
31     }
32
33 }
```

**Scene Selection Script** – This user will handle when the user select the room on UI interaction canvas. After choosing the room via UI interaction, users will be move to the scenes according to their preferences.



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```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.UI;
5
6 public class VolumeControl : MonoBehaviour
7 {
8     [SerializeField] Slider volumeSlider;
9     [SerializeField] Text volumeText;
10
11 void Start()
12 {
13     if(!PlayerPrefs.HasKey("musicVolume"))
14     {
15         PlayerPrefs.SetFloat("musicVolume", 1);
16         Load();
17     }
18     else
19     {
20         Load();
21     }
22 }
23
24 public void ChangeVolume()
25 {
26     AudioListener.volume = volumeSlider.value;
27     UpdateVolumeText();
28     Save();
29 }
30
31 private void UpdateVolumeText()
32 {
33     volumeText.text = (volumeSlider.value * 100).ToString("F0") + "%";
34 }
35
36 private void Load()
37 {
38     volumeSlider.value = PlayerPrefs.GetFloat("musicVolume");
39     UpdateVolumeText();
40 }
41
42 private void Save()
43 {
44     PlayerPrefs.SetFloat("musicVolume", volumeSlider.value);
45 }
46 }
47
```

**Volume Control Script** – This will handle volume on option menu. When the user setting the volume according to their preferences, the variable will be save inside the Unity. Then the volume settings will be applied accross all scenes.



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```
1 using System.Collections;
2 using System.Collections.Generic;
3 using UnityEngine;
4 using UnityEngine.UI;
5
6 public class RoomInformationManager : MonoBehaviour
7 {
8     public GameObject roomInfoPanel;
9
10    public FirstPersonLook mouseLookScript;
11
12    public static RoomInformationManager Instance;
13
14    private bool isRoomInfoShown = false;
15
16    private void Awake()
17    {
18        if (Instance == null)
19        {
20            Instance = this;
21            DontDestroyOnLoad(gameObject);
22        }
23        else
24        {
25            Destroy(gameObject);
26            return;
27        }
28    }
29
30    if (!isRoomInfoShown)
31    {
32        ShowRoomInformation();
33        isRoomInfoShown = true;
34        Cursor.visible = true;
35    }
36    }
37
38    public void ShowRoomInformation()
39    {
40
41        roomInfoPanel.SetActive(true);
42
43        Time.timeScale = 0f;
44        Cursor.lockState = CursorLockMode.None;
45        Cursor.visible = true;
46        mouseLookScript.mouseLookEnabled = false;
47    }
48
49    // Update is called once per frame
50    public void CloseRoom()
51    {
52        roomInfoPanel.SetActive(false);
53
54        Time.timeScale = 1f;
55        Cursor.lockState = CursorLockMode.Locked;
56        Cursor.visible = false;
57        mouseLookScript.mouseLookEnabled = true;
58    }
59 }
60
```



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**Room Information Manager Script** – This will handle room information everytime the user choose any room.

**Appendix B – Additional Material**

ROOM	ASSETS	LINK
LOBBY	Computer	<a href="https://free3d.com/3d-model/monitor-79124.html">https://free3d.com/3d-model/monitor-79124.html</a>
	Flower Vase	<a href="https://free3d.com/3d-model/tulip-in-a-vase-49970.html">https://free3d.com/3d-model/tulip-in-a-vase-49970.html</a>
	Flower Pot	<a href="https://free3d.com/3d-model/indoor-pot-plant-77983.html">https://free3d.com/3d-model/indoor-pot-plant-77983.html</a>
	Elevator	<a href="https://www.cgtrader.com/items/833688/download-page">https://www.cgtrader.com/items/833688/download-page</a>
	Telephone	<a href="https://www.cgtrader.com/items/4398240/download-page">https://www.cgtrader.com/items/4398240/download-page</a>
	Lamp	<a href="https://free3d.com/3d-model/hanging-light-845206.html">https://free3d.com/3d-model/hanging-light-845206.html</a>
	Door	<a href="https://free3d.com/3d-model/entrance-door-494604.html">https://free3d.com/3d-model/entrance-door-494604.html</a>
	Clock	<a href="https://free3d.com/3d-model/wall-clock-930580.html">https://free3d.com/3d-model/wall-clock-930580.html</a>
BED	LED TV	<a href="https://free3d.com/3d-model/mi-smart-tv-32-inch-239229.html">https://free3d.com/3d-model/mi-smart-tv-32-inch-239229.html</a>
	Window	<a href="https://free3d.com/3d-model/wooden-window-5561.html">https://free3d.com/3d-model/wooden-window-5561.html</a>
	Wardrobe	<a href="https://free3d.com/3d-model/wardrobe-4-doors-755350.html">https://free3d.com/3d-model/wardrobe-4-doors-755350.html</a>



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Westafel <https://www.cgtrader.com/items/875507/download-page>

Shower <https://www.cgtrader.com/items/875507/download-page>

Mirror <https://www.cgtrader.com/items/875507/download-page>

### MEETING ROOM

Checkboard <https://www.cgtrader.com/items/3002555/download-page>

Curtains <https://www.cgtrader.com/items/4519231/download-page>

### SWIMMING POOL

Pool <https://www.cgtrader.com/items/1833002/download-page>

Stairs <https://www.cgtrader.com/items/4661292/download-page>

Lamp <https://free3d.com/3d-model/punct-pendant-lamp-86726.html>

Window <https://free3d.com/3d-model/-pane-casement-windowpine-v1--786233.html>

### CAFE

Picture Frame <https://free3d.com/3d-model/ikea-frame-66557.html>

Window <https://free3d.com/3d-model/window-29094.html>

Cashier Machine <https://www.cgtrader.com/items/3929146/download-page>



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Door <https://www.cgtrader.com/items/171660/download-page>

Hanging Light <https://free3d.com/3d-model/hanging-light-845206.html>

