Task 1 (da exemple)
All of the information is taken from the Multimedia Document Models pdf from the course as well as from the Chapters of the Dissertation of Susanne Boll provided in the course (but modified in my own words).

1.1 Explain the terms multimedia document, multimedia document model, multimedia document format, and multimedia presentation. For each category, give one example from the context of the World Wide Web.

A **multimedia document** represents a new media entity that consists of discrete and continuous multimedia elements combined, which together can be treated as a unit. Its components can also be manipulated individually. A multimedia document that is created before playback/rendering is called "pre-orchestrated" or "synthetic" while a document that is composed at the time of playback/rendering is called "time-continuous".

Example: a website with pictures and text for a school project

A **multimedia document model** defines the basis of a multimedia document by presenting the basic objects that are used to obtain a multimedia document and how they are combined. The power of a multimedia document model is equivalent to its multimedia functionality, which is an important aspect regarding the conversion of a multimedia document into another format. If the two (source and output) don't have the same "power", the conversion will be lossy.

Example: ZYX Model

A **multimedia document format** represents the way in which a multimedia document is encoded.

Example: the way an XML file stores data in plain text => plain text format

A **multimedia presentation** realises the rendering/playback of a multimedia document in a specific environment. It is responsible for the import and continuous rendering of a multimedia document into the environment, the synchronisation between different media streams, as well as it is responsible for any hypothetical context changes.

Example: an educational PowerPoint presentation

1.2 Give an overview of the concepts of reuse, presentation neutrality, and adaptation. Outline the purpose of each concept by means of a (multimedia) format or the language of your choice and complement your explanations with practical examples.

Reuse
The producing of multimedia content is a costly process which is why it is important to reuse products for different purposes. The granularity determines to what extent a multimedia document is being reused, depending on the context:

Reuse of Media Components
It may be that two different users are in need of the same multimedia document for different use cases. For example a multimedia document that contains video, audio, text, subtitles is used in two different contexts: one context may only need the video with the explanatory text and the other one may only need the video with the subtitles. In this case, we talk about the reuse of media components.

Reuse of Media Fragments
Here a use case may need only a specific section from a multimedia document. This section is exactly the same as in the original document so here we talk about the reuse of media fragments.

Reuse of Multimedia Documents
Depending on the context, a multimedia document can be entirely reused with different purposes.

Reuse Example: a website that was created with an informative purpose can be also used in an html learning workshop as an example

Presentation Neutrality
Multimedia documents are most likely going to be presented on different output channels. To fit the different contexts, presentation neutrality is used which represents the delimitation of the document's structure from its presentation layout, which implies that the layout that matches the output device is added just before the delivery and presentation of the content. The degree to which this delimitation takes place is important for the conversion of the document into the respective format in which the presentation takes place.

Presentation Neutrality Example: a responsive web application will have different layouts according to the size of the screen or output device (using it on a laptop displays a different layout than using it on a smartphone).

Adaptation
A multimedia document should be able to be adapted to specific conditions imposed by the user, such as technical infrastructure, knowledge degree, interests, environment. In order to obtain this adaptation into a multimedia presentation, a multimedia document should be able to offer alternative ways for rendering its content, depending on the context, while leaving the information semantically equivalent. From a technical point of view, this would mean that the resolution of images and video's frame rate would be adapted to the user's possibilities. Moreover, depending on the case, the user may need text instead of an image or an animation instead of a video or so on. From a non-technical point of view, this means adapting the content such that it serves its purpose for the user.

Adaptation Example: PowerPoint educational presentation on a specific subject may be used both for bachelor students and high school students, but for the latter the explanatory texts would be simplified.

Task 2 Analyze the Microsoft PowerPoint document format. Can this format be regarded as a multimedia document model? To answer this question, consider:

2.1 Which mechanisms are provided by the format to integrate media components, metadata about these components, and the constructs for temporal, spatial, and interactive media composition.

Microsoft PowerPoint provides the user the possibility **to integrate** different multimedia components like text, audio, images, video, animations into the slides, such as **embedding** the component so that it now becomes part of the document, or by **referencing** components, through links on slides such that the document does not include the actual component, but a reference to it.

Extracting **metadata** of individual embedded components is not supported in PowerPoint. However, the user can extract metadata from the whole document.

It supports **temporal composition**, by allowing the combination of slides into a final video presentation that is based on a timeline.

It supports **spatial composition**, by allowing the user to define and modify spatial relationships between components, thus creating a spatial layout.

It supports different types of **user interaction**, such as movie interactions, scaling interactions and decision interactions. These provide the user with a way to manipulate the document, such as stopping, starting, pausing, and fast forwarding a presentation, or changing the appearance of the presentation.

2.2 Which mechanisms are provided by the format to support reuse, presentation neutrality, and adaptation.

PowerPoint supports **the reuse** of components by allowing the user to create its own components which are then reusable in other PowerPoint documents. These objects can be effects, animations, groups of elements, etc.

PowerPoint supports **presentation neutrality** by delimiting its document's structure from the document's layout, thus allowing usage over different output channels.

PowerPoint supports **adaptation** by providing the user the possibility of extracting the presentation to different multimedia formats, in order to adapt to its personal needs and its context.

Conclusion
Microsoft PowerPoint respects all requirements of a multimedia document model, so it can be defined accordingly.

Task 3 Integration of Media Blocks into a Multimedia Document:

3.1 Describe the different forms by which media blocks can be integrated into multimedia documents and outline the difficulties that need to be considered in this context.

The two **forms of integration** of media blocks into a document that are presented in this course are: embedding and referencing.
Embedding a media block implies that it becomes part of the document.

Referencing a media block means providing a way to access it, such as a link to the web server where it can be found or a path to where the file is saved locally.
This mechanism is good for keeping the components up-to-date.

There are **problems** that can occur through referencing and that need to be taken into consideration.

First, the media blocks that are integrated are usually saved in **different locations**, which is why the document that contains them should provide a referencing mechanism that is able to locate them.
Multimedia documents can integrate different sorts of media blocks that come from **different kinds of sources**. Depending on the type of source, it needs to be referenced in different ways. Again, the referencing mechanism should be able to support these sourcing differences.
The different kinds of media blocks are also accessed by **different protocols** which need to be supported by the referencing mechanism.

3.2 Analyze how HTML supports the integration of media objects and compare them to a multimedia document format of your choice.

HTML is a document format which allows the organisation of its text into paragraphs, a well as the definition of tables, different headings, or the integration of multimedia objects through tags. These objects can be images, videos, audio, etc. It also allows referencing media documents through a special tag <a> with the attribute href. External resources can also be integrated using the <object> tag

An XML document is made of XML elements. An element can also be empty, by using the <element> tag. While the tags in HTML are predefined, the tags in XML are designed by the user through an XSD schema, which offers XML tags freedom of extension compared to those of

HTML. Moreover, the tags in HTML are destined to display the data, while those in XML are destined to store the data.
The HTML tags do not necessarily need closing tags, while XML tags do. An XML element can contain text, attributes, other elements, or a combination of these. An XML document is structured as a tree made of XML elements, between which there exist parent-child relationships. In both HTML and XML there is a root tag: <html> in HTML, and the name of the root element defined by the user in XML.

3.3 Apart from the general difficulties in integrating media objects, what else needs to be considered for displaying and rendering media objects within a browser?

Rendering and displaying of media objects are mechanisms that are handled by each browser and may differ from browser to browser. This is why incompatibilities may occur. It is important to check whether these incompatibilities occur, what methods are affected and in which browsers. Often they can be solved using additional configurations or softwares.

Task 4 Discuss the main modeling primitives provided by HTML5 to support basic and advanced media composition aspects:

4.1 Which temporal dependencies between media objects does the temporal model define for a multimedia document? Explain how each temporal composition is supported by HTML5. Do you know a Web-based multimedia presentation technology providing better support?

The 3 Temporal Models referenced in this course are:

Point-Based Temporal Model

This model refers to a media element in a multimedia document as being represented by points in time that define the start and the end of the respective element. These points are based on a timeline and should last zero seconds. Between each two points on the timeline, there is a temporal relationship such as: before <, after > or parallel =.

HTML5 supports the integration of media elements such as <audio> and <video> and YouTube videos, as well as methods to manipulate them such as play() or pause(), which allow the user to visualise the elements according to the respective timeline.

Interval-Based Temporal Model

Here the information is represented by closed intervals that are defined by two points in time, which again last 0 seconds. There are 13 types of basic relationships that can exist between two time intervals but there are also "n-ary" relations which come in handy when we need to synchronise multiple multimedia objects at the same time, like a sequence of frames for a video.

In HTML5, synchronisation can be achieved through an external controller in JavaScript that can be added to the HTML document with a <script> tag.

Extended Interval-Based Temporal Model

This model is used in the presentation of time intervals that don't have a defined end : "the presentation ends, when the user selects a certain button". Two closed intervals have a relationship based on a delay, without the need for it to be fully specified.

The multimedia elements <audio> and <video> in HTML5 have different properties that can be adapted in order to obtain the wanted solutions such as the loop property, which can be used to play the respective audio/video indefinitely (until the user stops it) or the autoplay property, which starts the element once a user enters the page. HTML5 also supports the integration of moving images such as gifs that also move indefinitely. On a web page, there could be at the same time

videos that require the users click to start playing. This way the elements have a temporal relationship based on delay.

<u>Web-Based Multimedia Technology that provides better support:</u>
Currently there is no equivalent competitor that defeats HTML5, but there are alternatives to it when building web applications. One could build native applications which requires more effort and planning but is more suitable in some use cases like when the application is graphic intensive or when the appearance of the app is very important. There are also Web Development Frameworks like Angular or Laravel that can be used in the process.

4.2 How is the spatial composition of media objects supported in HTML5?
A structural model for spatial composition defines how different media components are placed related to each other, forming a layout.
The structural models for Spatial Composition referenced in this course are:

• Absolute Specifications of Visual Arrangements
• Relative Specifications of Spatial Arrangements
• Directional Relations
• Topological Relations

The spatial layout in HTML5 is obtained through different specific tags that allow the user to place the elements where it wants to on page. Example : <nav> <header> <footer>, and so on.

Task 5 Analyze how the advanced requirements of adaption, reuse, and presentation neutrality are addressed by HTML5:

5.1 Give a brief overview of each concept, the aspects it covers, and elaborate on how it is supported by HTML5.

Adaptation
The capability of a multimedia document to offer alternative ways for rendering its content, depending on the context and the user's needs.

Adaptation in HTML5 can be achieved through scripts that are able to manipulate the content and styling of a document. Through a script, the page is able to collect the visitor's device's technical configurations. This data, together with other data which is not relevant for us now, creates a visitor's profile which can be used in order to personalise rendering.

Reuse
A multimedia document may be, once created, reused in other contexts, with another granularity.

HTML5 allows the reuse of whole documents or media elements through URL referencing, but it doesn't support the reuse of parts of media elements, fragments or any kind of structural reuse.

Presentation Neutrality
Represents the delimitation between a document's structure and its layout, with the purpose of making the document available for usage on different output channels.

An HTML5 document can run anywhere where there's a browser. By implementing responsive layout techniques, the document can look in the desired way on different output channels. HTML5 offers various way in which a document can be responsive, such as adding the <meta> tag to a page, adjusting an image's width property, or using Bootstrap.

5.2 Illustrate the purpose of each concept by means of concrete examples. Think about their differentiation.

Adaptation
With different users come different needs, different technical capabilities. It is important to offer alternatives for rendering the content.

Example: JSON is a format which Is both easily readable by humans, and it also can be generated and parsed easily by computers.

Reuse
The creation of multimedia documents is a very time consuming process which is why reuse is an important aspect. It gives the user the possibility to speed up the process towards its destination. The user is able to focus on other aspects of its project.

Example: HTML allows referencing whole documents through different tags such as <a href = …> or <iframe src = …>

Presentation Neutrality
A document may be integrated in different contexts and it is important to make it available to different output channels, depending on the context and needs.

Example: A HTML document can be opened in a browser on a computer, as well as on a smartphone. There are techniques (which I've mentioned earlier) that can be used so that the document's layout becomes responsive and adapts itself to all sorts of devices.