



Diploma Thesis

Tax Calculator Software Application

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DIPLOMA THESIS ASSIGNMENT

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Systems Engineering and Informatics
Informatics

Thesis title

Tax Calculator Software Application

Objectives of thesis

The goal of this thesis is to design and implement a web application to assist people to be aware and decide about taxing of job in more countries.

Methodology

The first part of thesis will discuss the theoretical side of the subject. This means what are different kinds of taxing, varying on the citizenship and age of a person, working hours, and the software technology used in the second part of thesis. The second part of thesis will document the practical design and implementation of the software application made by PHP language.

The proposed extent of the thesis

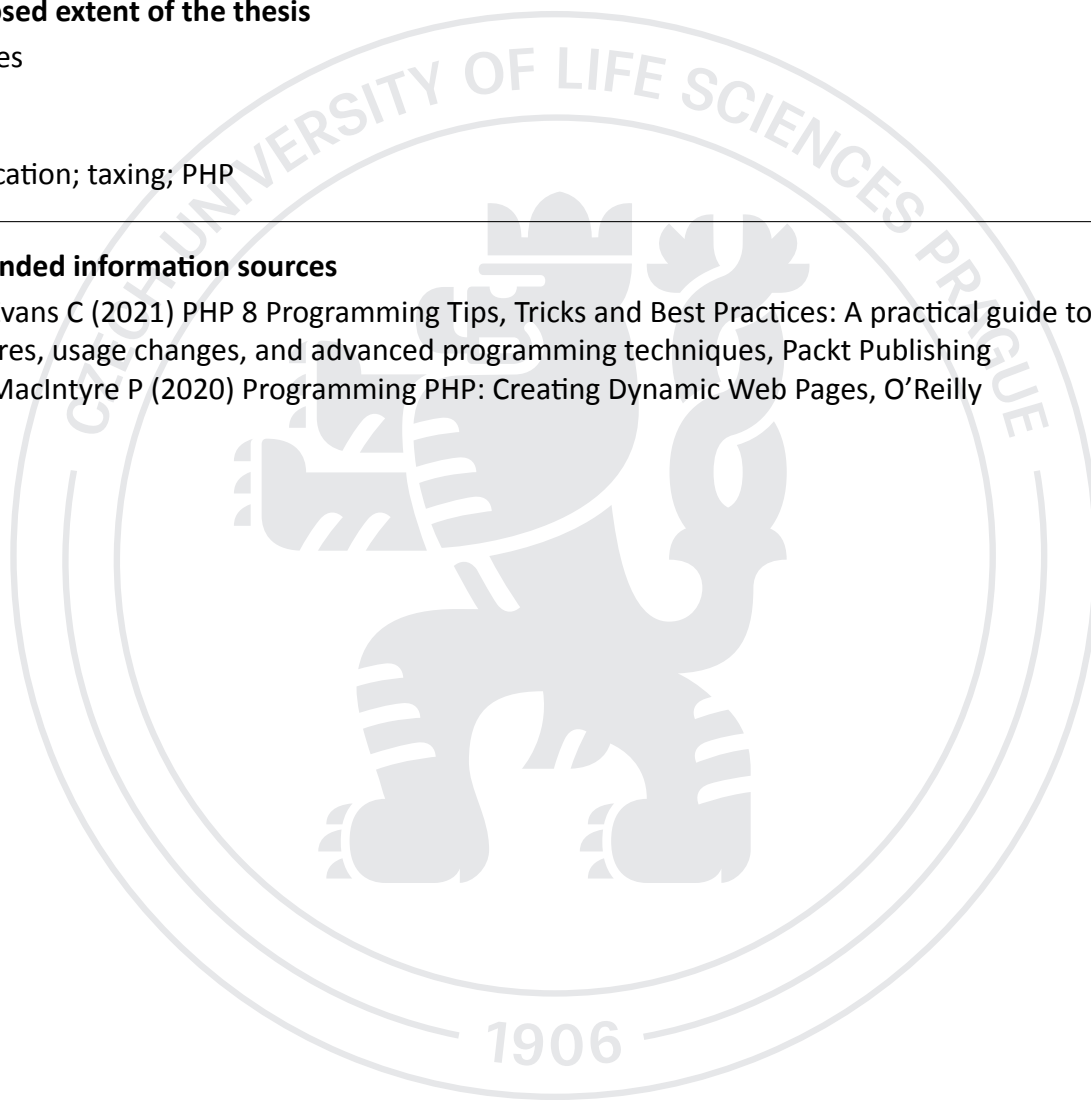
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Bierer D, Evans C (2021) PHP 8 Programming Tips, Tricks and Best Practices: A practical guide to PHP 8 features, usage changes, and advanced programming techniques, Packt Publishing
Tatroe K, MacIntyre P (2020) Programming PHP: Creating Dynamic Web Pages, O'Reilly



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Declaration

I declare that I have worked on my diploma thesis titled "Tax Calculator Software Application" by myself and I have used only the sources mentioned at the end of the thesis.

As the author of the diploma thesis,
I declare that the thesis does not break the copyrights of any third person.

In Prague in November of 2022

Signature_____

Fatma Elzahra Omar Omar

Tax Calculator Software Application

Softwarová aplikace Daňová kalkulačka

I. Abstrakt

Smyslem práce je pomoci zejména jednotlivcům a cizincům získat rychlý přehled o jednoduchém a srozumitelném srovnání daňových systémů mezi některými konkrétními zeměmi jako výchozí bod pomocí aplikace „Tax-Calculator“.

Důvodem pro výběr webové aplikace z pohledu průměrného uživatele je to, že webová aplikace je dosažitelná a uživatelsky příjemný nástroj.

Kromě toho by bylo snazší v budoucnu aktualizovat a přidat daňový systém jakékoli nové země.

Během výzkumu budu diskutovat o faktorech, které ovlivňují daň z příjmu a jak by jednotlivec mohl z této daně profitovat, ať už přímou nebo nepřímou cestou.

Konečný výsledek bude záviset na straně uživatele při používání aplikace, protože uživatel je jediný, kdo se může rozhodnout, který daňový systém je vhodný pro jeho vlastní okolnosti.

I z pohledu uživatele bude výsledkem PHP stránka, která obsahuje čistou mzdu jeho příjmu po všech srážkách pomocí velmi jednoduchých vstupních dat, takže uživatel se může rozhodnout, která země je lepší pro jeho plat, snahu, jeho sociální situaci a vylepšená verze aplikace bude zahrnovat i korporace, takže si uživatel bude moci vytvořit svůj vlastní účet a uložit vstupní data pro budoucí použití.

Klíčová slova— : webová aplikace, php, daně, zdanění, daňový systém, data, sazba daně, srovnání.

II. Abstract

The work's purpose is to help individuals and foreigners especially as well, to get a quick overview of a simple and understandable comparison of the taxation systems between some specified countries as a starting point, using the "Tax-Calculator " app.

The reason for choosing the web application from an average user's perspective is that the web app is reachable and a friendly-use tool.

In addition, it would be easier to update and add any new country's taxation system in the future.

During the research, I will discuss the factors that affect income tax and how the individual could benefit from that tax, whether direct or indirect way.

The final result will be depending on the user's side while using the application because the user is the only one who can decide which taxation system is suitable for his own circumstances.

From the user's point of view as well the result will be a PHP page that contains the net salary of his income after all deductions using very simple input data, so the user can be able to decide which country is better for his salary, efforts, his social situation, and with the improved version of the app will include the corporates as well, so the user could be able to create his own account and save the input data for future use.

Keywords— : web application, PHP, tax, taxing, taxation system, data, tax rate, comparison.

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Chapter 1

Introduction

Each nation has its unique taxation system based on a variety of criteria that are influenced by the country's resources and have an impact on an individual's income. As a result of being a citizen of that nation and receiving advantages from its services, it is your responsibility to repay these benefits in a different method or form, that's how to create a win-win situation when it's fair.

The Tax-Calculator application would serve this duty, depending on each country's law, economy, and tax rate.

The tax calculator is a tool that can help you estimate your personal monthly tax liability.

This calculator is designed for a variety of users including the residents themselves and is based on the most recent tax rates.

The following chapters will discuss the research inspiration ,the Idea of the application, research goals and the questions that would be addressed over the research.

1.1 The foundation and inspiration for the concept of the “Tax-Calculator”

Taking advantage of various aspects, such as using web development tools, business experience, studying economics, and the core of the research (which is the demand), has inspired me to find a way to create a tool that would be simple and understandable for users while encompassing most of the important aspects of the tax process in readable detail.

1.2 Idea of the application

In brief, to use the calculator, simply you will be asked to enter some information such as your residence country, monthly personal income, some social information and the health status, if applicable.

Afterwards, the calculator will then provide an estimate of your taxes owing based on the nation you selected.

Remember, this is only an estimate - your actual tax liability may be higher or lower depending on your individual circumstances.

That was a simple approach to elaborate on and explain the significance of the tax.

1.3 Goals of the research and the application

A Very beginning goal of the research is to become acquainted with numerous topics relevant to the taxation system in general, as well as to explain how it works in a clearly simple manner.

It will be followed later by the taxing systems of Germany, the Czech Republic, and Egypt.

different tax formulas and rates so that the user may select which nation best matches his income, social condition, and likely future business.

1.4 Research questions:

The research questions that will be addressed:

1. What is taxing system and how it works
2. Why do we need tax
3. what are different kinds of taxing system categories
4. Allowances (tax benefits) types
5. How tax affect economy (tax factors)
6. Comparison between countries' taxing systems

1.5 Outline

The structure of the thesis for the goal and purposes is described in this chapter, as well as an introduction of the connections between the various chapters in a sort of general way.

A theoretical framework will be explained in the following chapters in detail. This theoretical perspective will begin with a definition of the personal income tax affairs and how it works in Czech Republic, Germany and Egypt separately.

by using some formulas and geometrically showing the results, as well as comparing each result, considering each country's economic situation and expound how it affects the tax rate annually which by its turn would affect the individual income.

how to essentially develop an application that will aggregate many nations, implying numerous taxing systems, and it enhances both safety (in the stage of registering corporate accounts) and user experience

The technical implementation of the comparison, which will validate the research hypothesis, will effectively end the theoretical investigation.

Chapter 2

Objectives and Methodology

2.1 Objectives

The key objective of the Diploma thesis is to design and implement a web application to assist people to be aware of the income tax in different countries.

The first objective is to explain the factors affecting the amount of tax deduction from personal income.

The second objective is to explain how the process should be done for normal user/personal use.

2.2 Methodology

The methodology of this study is based on the income amount comparison between specific countries.

The first part of the thesis will discuss the theoretical side of the subject.

This means what are different kinds of taxes, varying on the citizenship and age of a person, working hours, and demonstrate how the benefit for each individual of the income tax is varying depending on the country's needs.

In the practical part, by using the software technology, will document the practical design and implementation of the software application made by the PHP language.

Then the conclusions of the diploma thesis will be formulated.

Chapter 3

Literature Review

3.1 Research Theory

3.1.1 Understanding the Tax System

"Taxation" Taxation is the price we pay for civilization.

Oliver Wendell Holmes

"Oliver Wendell Holmes Jr." 'The American legal scholar who served as an associate justice of the Supreme Court of the United States' who has described the tax briefly.

It is easy enough to see why government officials would want to put that quotation on display because it counsels people to be pleased with the taxes they pay.

"Britannica" First let explore the taxation system, which is the imposition of compulsory fees on individuals or corporations by governments.[F98]

Taxes are collected in nearly every country in the world, primarily to support government expenditures, although they serve other purposes as well.

This research is involved with introducing the taxation system in general, its categories, and its classes; especially, the research discusses the nature and purposes of taxation in order for the user of our application is aware of different taxation systems, whether taxes should be classified as direct or indirect, the category of taxation that varies from country to country, and the economic effects of taxation.

Taxes with a broad scope are the primary source of governmental income in modern economies.

They are generally paid in exchange for some indirect services you will gain, such as a particular public service,for instance, in real life you will get a better public transportation availability, that's how you will get back what you have paid in a form of your income tax.

Since it is assumed that the purpose of income taxes is to benefit all taxpayers in a similar manner. Nevertheless, the obligation of each individual taxpayer to pay taxes will guarantee the tax has no bearing on any specific gain received. Because not all taxpayers in the previous scenario would use public transit but still they are obligated to pay tax.

As a result, payroll taxes, which are the focus of this research, are typically charged on the personal income to cover retirement benefits, medical coverages, and other social insurance programs, and that's how all of which are likely to benefit any taxpayer one way or another.

Payroll taxes are also referred to as "contributions" because of the potential link between taxes paid and benefits gained. However, the payments are frequently mandatory, and the relationship to benefits is sometimes unclear.

Another example of a tax that is linked to benefits gained, is the usage of vehicle fuel taxes to fund the building and maintenance of roads and highways, the services of which can only be gained by consuming charged vehicle fuels.

3.1.2 Different Types of Taxation

[Inv22f]

- **Income tax:**

It is the type in which the government collects income taxes, on all financial revenue produced by entities under their control, including individuals and corporations.

- **Corporate tax:**

This sort of tax is paid on a corporation's revenue.

- **Capital gains:**

A capital gains tax is applied on any earned income or profits obtained by individuals or corporations from the sale of various assets such as stocks, bonds, or real estate.

- **Property tax:**

A property tax is estimated by the local government and paid for by the property owner. This tax is estimated depending on the value of the property and the land.

- **Inheritance:**

A sort of tax imposed on individuals who inherit a deceased person's legacy.

- **Sales tax:**

A government-imposed consumption tax on the selling of products and services. such as a Value-Added Tax (VAT), a Goods and Services Tax (GST), or a state or provincial sales tax.

3.1.3 Principles of Taxation: [Bri98]

In *The Wealth of Nations* (Book V, chapter 2), ‘the 18th-century economist and philosopher Adam Smith’ claimed that a good tax system should meet the following principles:[Okp19]

1. equity / Fairness
2. Economy / Revenue sufficiency
3. certainty / transparency
4. convenience /Simplicity

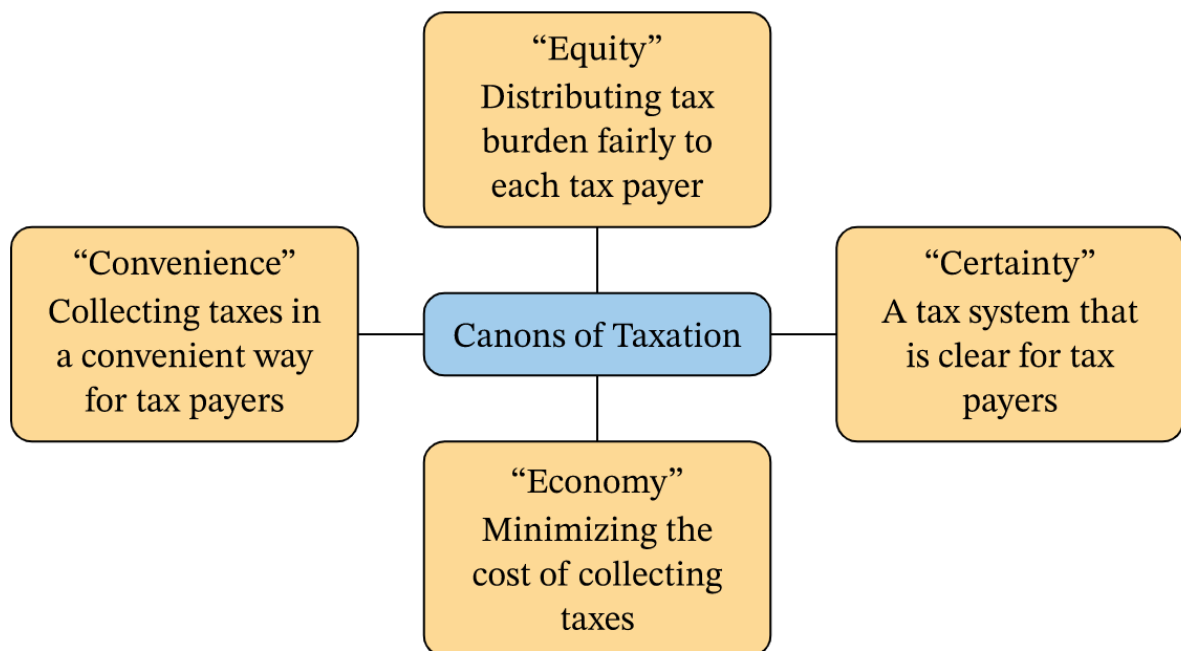


Figure 3.1: the canons of taxation
[W20b] Source: [Nag22]

3.1.4 A few helpful tax definitions

- Tax Burden: [MLA17]

is the ratio of the taxes that paid to the government in a particular term and the revenues that earned in the same term.

- Tax exemption/reliefs: [Inv22h]

1. Refers to any initiative or policy from the government that was particularly established to help individuals and corporations in cutting their tax loads or paying off some kind of their tax-related obligations.
2. Another form of the tax relief is “the Universal tax cuts”, special programs that help certain taxpayer groups, or programs that further certain government objectives. For instance, Parents with children receive a tax cut due to “the child tax credit”.

3.1.5 Basic Tax Types:

[Tax22b]

All taxes may be broken down into three categories:

- taxes on your purchases
- taxes on your income
- and taxes on your assets.

1. sales taxes:

When purchasing the majority of products and services, customers must pay sales taxes. These taxes bring in money for the state and the local government, which then pays for services such as healthcare, transportation, and education.

2. Income taxes (The research’s interested type):

You may have to pay income taxes on a diverse selection of sources of income, including taxes deducted from your salary.

3. Property taxes:

Here the revenue is generated locally through property taxes. Which is supporting everything from parks to services associated with public safety to greater financing for schools.

3.1.6 Personal income tax:

- Governments apply several types of taxes on the profits made by corporations and individuals under the category "income tax."
- Governments receive funding from income taxes. They are used to pay for debts owed to the government, support public services, and supply residents with products. [Inv22g]
- Personal income tax: is collected against employee earnings and salaries to fund social insurance programs.
- The majority of taxpayers will be familiar with payroll taxes through looking at their payslip at the conclusion of each pay period, where it is plainly stated how much payroll tax was deducted from their income by their employer.[Tax22c]
- In most cases, income tax is calculated by multiplying the amount of taxable income by the tax rate. The category of taxpayer and the type of income are two factors that might affect the tax rate. [F22a]

3.1.7 What is CTC?

- CTC is one of the ambiguous terms used to define salaries.
- CTC stands for Cost To Company. It is the amount that the corporation will spend on recruiting and keeping a worker.
- An employee's income and any additional benefits they receive, such as meal cards, office space rent, Provident Fund contributions, health insurance, House Rent Allowances (HRA), and any other costs made by the company, are all covered by CTC.
- It should be kept in mind that CTC differs from the real revenue from pay that an individual gets since CTC comprises more factors than the actual income that an individual is receiving. [F22b]

3.1.8 Elements of the personal income:

- Fixed Pay:

This element includes both the base salary and special allowances. Whatever the objectives, the employees are entitled to this financial support.

- Variable Pay:

Variable pay includes rewards/bonuses and production-based promotions:

1. Periodic payments, such as those made every six months or annually, are included in the bonus.
2. Your frequent performance evaluations from management and colleagues may or may not have an impact on the bonus.

A commission or achievement payoff is a payment that is dependent largely on achieving targets such as number of calls, sales, and other metrics.

Your employment agreement with your employer will determine this.

- Allowances:

1. The remainder of your total CTC is usually made up of allowances.
2. There are many sections for allowances and employment benefits.
3. The Home Rent Allowance (HRA), Medical Allowance, Travel Allowance, Leave Allowance, and Transportation Allowance are the most popular allowances.
4. and I will discuss the allowances categories in detail in the following section.

- Perquisites:

1. Perquisites are extra benefits offered on top of the personal income. A perquisite may be of a financial or non-financial nature.
2. A cash obligation in the hands of the employees is taxable, subject to reliefs.
3. A non-cash benefit is taxable in the perspective of the employer. Rent-free accommodation, ESOP/Sweat Equity Shares, Employer Contribution to Superannuation Fund, Loan for 0% or Lower Interest Rate, Free Food, and so on are some of the popular non-cash perks and benefits.

- Pension Benefits:

Retirement benefits are the employer's contributions to a structured provident fund, pension plan, or gratuity.

- CTC Cost To Company:

The fixed salary, variable pay, perks and benefits, allowances, and pension benefits are all included in your total CTC. [F22c]

3.1.9 Personal deductions:

An individual can utilise the following deductions:

- Private pension insurance.
- Private life insurance .

[A22a]

3.1.10 Allowances (tax benefits) types:

- Basic personal tax relief.
- Dependent–spouse relief:

This Allowance can be claimed by a resident taxpayer whose spouse does not have annual taxable income higher than average salaries.

- The basic dependent-spouse relief doubles in case of disability of the spouse.
- Other reliefs:

Taxpayers with disabilities may apply for a relief that is depending on the extent of the disability.

- A relief for students:

can be applied up to 26 years of age in most countries.

- Children tax allowances:

This type of tax allowance is available to resident individuals for each kid residing in the same home with them.

The allowance sum is determined by the number of kids.

3.1.11 Classes of taxes (direct and indirect)

[MS98]

- According to who is responsible for paying taxes, who eventually carries the tax burden, how much the burden may be transferred, and other factors, taxes have been categorised in a number of different ways.
- The two types of taxes that are most frequently categorised as direct and indirect are the income tax and the sales tax, respectively.
- The standards for differentiating direct and indirect taxes are widely contested among economists, and it is ambiguous which category certain taxes, including corporate income tax or real estate taxes, should fit into.
- Eventually let's say It is generally recognized that an indirect tax may be transferred from the taxpayer to a third party, even though a direct tax cannot.

1. Direct Taxes:

- Direct taxes are largely applied on individuals and are frequently calculated depending on the taxpayer's ability to pay back as indicated by their income, expenditures, or net assets/fortune.
- The basic categories of direct taxes are described below:
 - Tax on the Individual's income:
 - (a) Taxes are often applied when a taxpayer's total personal net income reaches a predefined limit.
 - (b) The taxpayer may be an individual, a couple, or a household.
 - (c) The conditions affecting the willingness to pay, such as family status, the number and age of children, and financial difficulties brought on by disability or health issues, are also frequently taken into consideration when adjusting them.
 - (d) Frequently, taxes are applied on progressive rates, which means that they increase as income does.
 - Tax on the net assets/fortune:
 - (a) Taxes on net assets are applied on an individual's overall net worth, which is determined by subtracting his responsibilities from the value of his assets.
 - (b) The taxpayer's individual state of affairs may be taken into account, much like with income tax.
 - Tax on expenditures:
 - (a) Expenditures taxes, commonly referred to as personal or direct taxes on consumption, are effectively applied on any income that is not targeted for savings.
 - (b) A direct expenditure tax may be adapted to an individual's ability to pay by taking into account factors such marital status, age, the household size, and other factors, unlike the indirect taxes on expenditure like the sales tax.

2. Indirect Taxes:

- The manufacturing or use of goods and services, as well as operations like imports and exports, are all subject to indirect taxes.
- Sales taxes, value-added taxes (VAT), taxes on any component of industrialization, taxes on legal transactions, and customs or import charges are a few examples.
- A significant percentage of goods and services are subject to general sales taxes. All taxable things may be subject to the same tax rate, or certain items (such as food or clothes) may be taxed at various rates.
- Sales taxes can exclude basics in order to reduce the tax burden on low-income households, even though taxes are normally applied to a wide variety of items.
- While in other nations, practically everything is subject to customs taxes, including basics of food, as well as non-essentials like cigarettes, Alcoholic beverage, coffee, and tea as well as luxuries like diamonds.

3.1.12 Summary for the tax classes:

[Gos22]

- **Direct Tax:**

is like when you earn your own income and have to pay a tax directly with the government, and it's not a transferable amount to any other entity or person.



Figure 3.2: Direct Tax

- **Indirect Tax:**

is like when you purchase stuff, the shopkeeper is the one who is responsible to pay the tax amount while the shopkeeper could collect that tax from you, so it's not directly paid to the government, as well as in that way the taxpayer can transfer it to another person.



Figure 3.3: Indirect Tax

3.1.13 Taxing system categories:

As the figure below shows, You can identify the tax categories depending on the impact that they have on how the individual's income is distributed, considering the relation between the tax rate and the income.

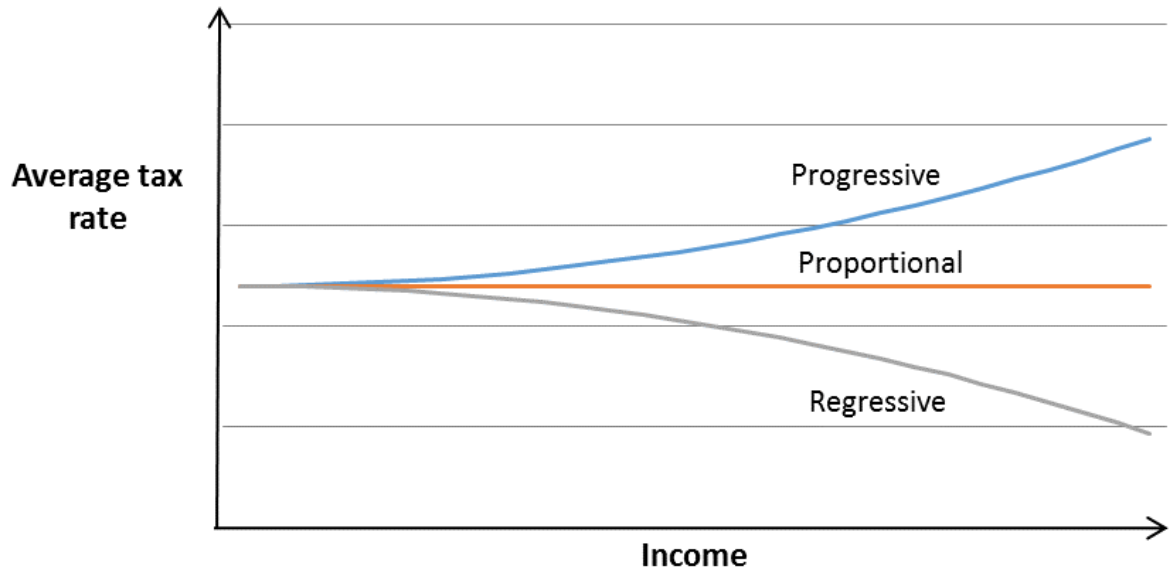


Figure 3.4: Taxes Categories
Source: [T17]

1. Progressive tax:[Inv22b]

- It is based on the amount of an individual's income that is taxed.
- Consequently, High income workers pay more tax than low income earners, therefore, as a person's wealth rises, the tax rate and tax obligations also increase.

2. **Regressive Tax:[Inv22c]**

- In this type of taxation, the government imposes on the people a fixed percentage of the value of the goods that the individual purchases or owns regardless of their income.
- That means people with low income would pay the same amount of tax for each product as the people with higher income.
- Which leads to eventually, the low-income individuals will pay a higher percentage of their income as a tax than the high-income individuals.
- Hence, practically, the tax would decrease with the increasing of the income.
- Regressive taxation is therefore unfair.[S14]
- It does not adhere to the equity canon that I discussed before in the Principles of taxation section.
- as well It has a tendency to highlight income disparities in the region.

3. **Proportional Tax:**

- a proportional tax applies the same percentage of tax rate to all taxpayers, independently of the income.[Inv22d]
- So, for individuals with low, moderate, and high incomes, the tax is the same.
- That's why this kind of tax category is sometimes referred to as flat tax.

3.2 Used Technologies:

3.2.1 PHP:

- **History:**

1. PHP stands for (Hypertext Preprocessor) which is a general-purpose scripting language designed for web development.[Man22]
2. Rasmus Lerdorf, a Danish-Canadian programmer, first developed it in 1993, and it was made public in 1995.[P13]
3. It is a free, open-source server-side scripting language that can be included into HTML codes to create dynamic websites.[S21]

- **Benefits of PHP:**

1. Open-source language, This indicates that using and implementing PHP is free.
2. A language that combines between the simplicity, understandable, and easy implementation language.
3. The flexibility to be integrated with several computer languages, including HTML and Javascript, and supports various databases, including MySQL, PostgreSQL, and Oracle.
4. Applications created using PHP can run in any environment since it is platform independent.
5. Very Stable.
6. Has a high market share.
[S21]

- **How does PHP work:**

1. The request for a web page is going from the Client to the Server through the browser:

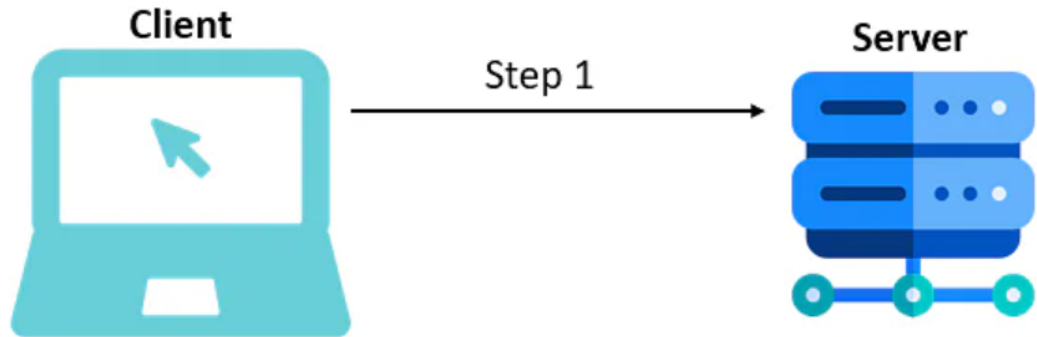


Figure 3.5: Step 1 - PHP
Source: [S21]

2. PHP is installed in that server, so the server searches for the file with extension .php that is related to the request.

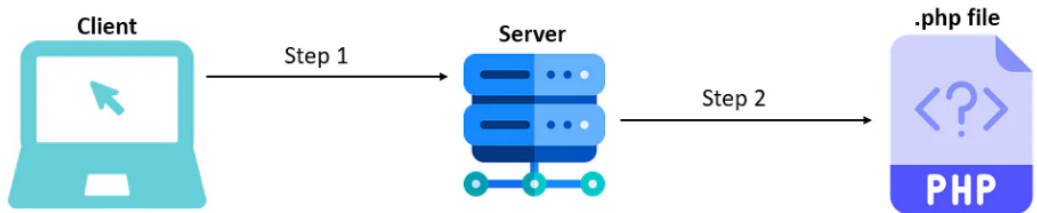


Figure 3.6: Step 2 - PHP
Source: [S21]

3. If found, it sends the file to the PHP interpreter (since PHP is an interpreted language), which checks for requested data into the database.

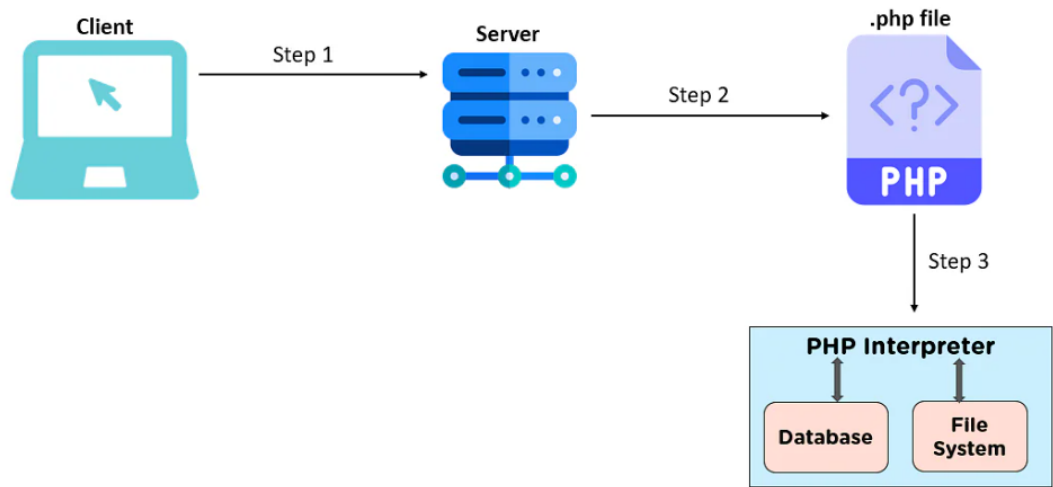


Figure 3.7: Step 3 - PHP
Source: [S21]

4. The interpreter then sends back the requested data output as an HTML web page (since a browser does not understand .php files).

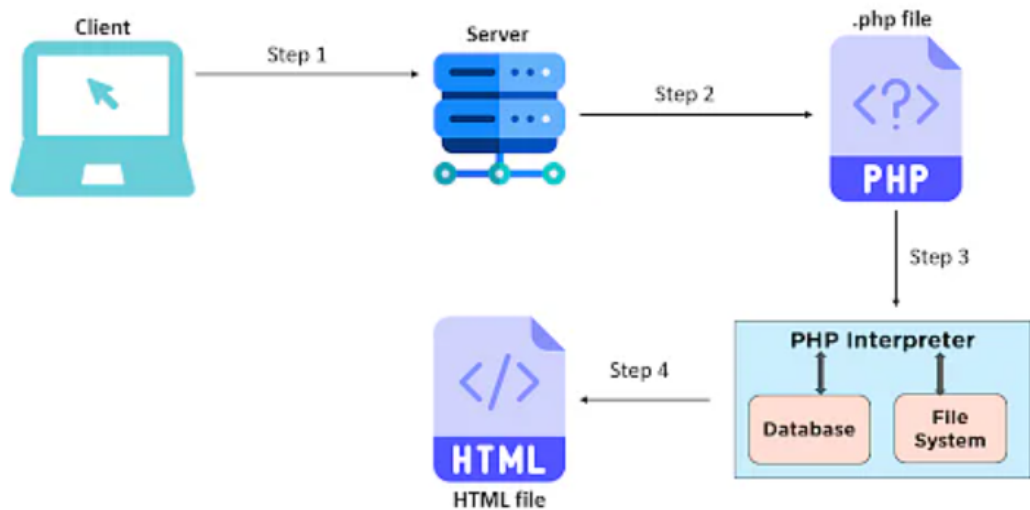


Figure 3.8: Step 4 - PHP
Source: [S21]

5. The web server receives the HTML file from the interpreter.

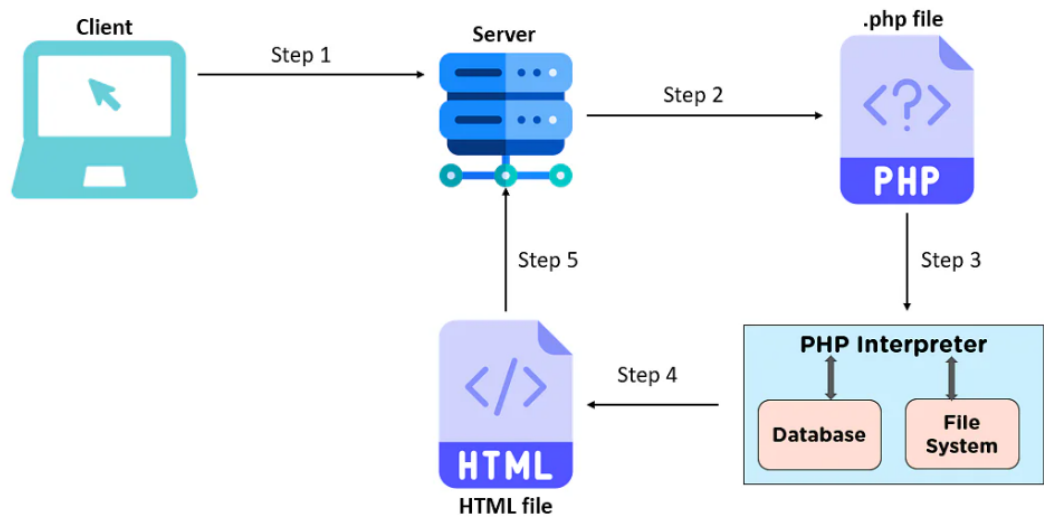


Figure 3.9: Step 5 - PHP
Source: [S21]

6. And then, it sends the web page back to the browser.

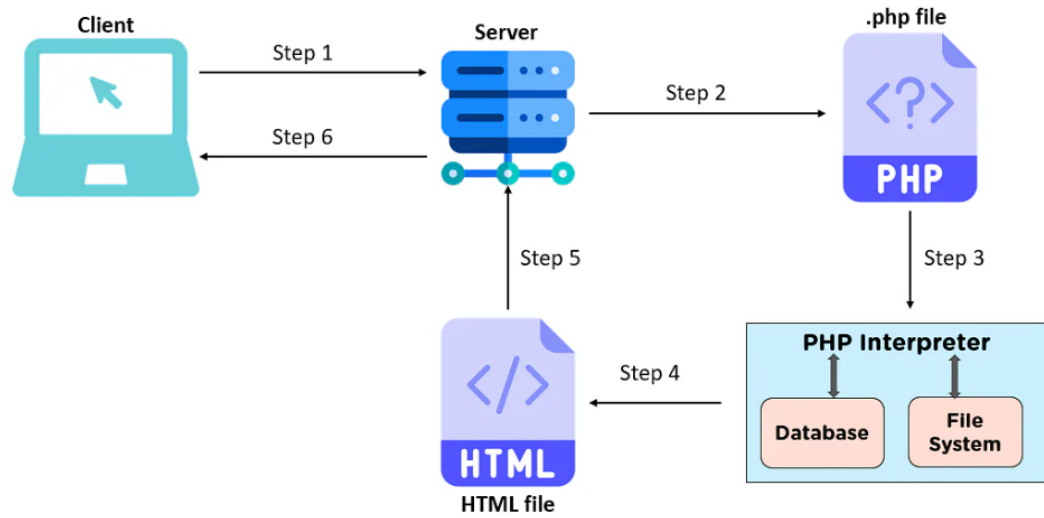
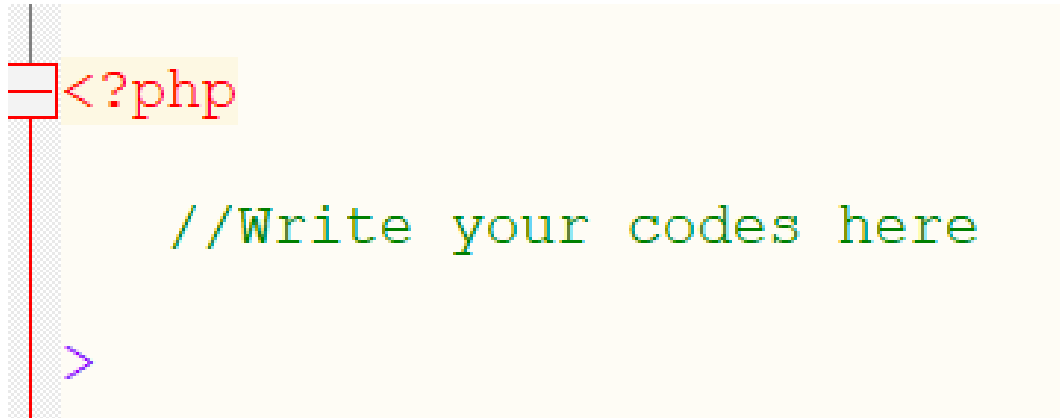


Figure 3.10: Step 6 - PHP
Source: [S21]

- **Syntax: PHP Script:**

Since a browser does not recognize raw PHP , we need to embed a PHP script within another language, such as HTML codes.

The script's syntax is as follows:[S21]



```
<?php  
  
//Write your codes here  
  
>
```

Figure 3.11: sample of PHP code
Source: [S21]

3.2.2 DOM:

- An XML or HTML document is treated as a tree structure with each node representing a different section of the document by the cross-platform and language-independent Document Object Model (DOM) interface.
- A document is represented by a logical tree in the DOM.
- A node, which contains event handlers, is where each branch of the tree ends.
- The event handlers are put into action once an event is triggered.
- With the use of DOM techniques, one may alter a document's structure, style, or content programmatically.[Wik22b]

3.2.3 HTML:

1. History:

- Hypertext Markup Language, or HTML as it is known, is a computer language that is used to design and create web pages.
- HTML illustrates how an internet browser should display a page.
- Tim Berners-Lee, a physicist, developed it in the late 1990s, and like any programming languages, it has advanced through time.[R22]

2. What does Hypertext mean?

- (a) Simply, is a text that is referring links to other texts in it.
- (b) You can navigate to other pages or parts of the content by clicking on these links.[E22]

3. What is Markup Language?:

- (a) Means a collection of markup symbols or codes added to a file between tags with the purpose of displaying it online.
- (b) The markup instructs web browsers on how to display the text and pictures on a web page.[Inv22a]

4. How does HTML work?:

- (a) These tags with the code contained are saved as an html file and can be read using an internet browser like Internet Explorer.
- (b) In order to display the page as intended by the author, this browser scans the file and converts the content into a viewable form.
- (c) It's important to use tags appropriately while creating your own HTML.
- (d) To produce HTML pages, you may use anything from a simple text editor to a robust graphical editor.[R22]

3.2.4 CSS:

- **CSS Introduction:**

1. CSS stands for (Cascading Style Sheets) is utilised as a styling language for describing the presentation of a document written in a markup language such as HTML or XML.
2. CSS is an essential technology of the World Wide Web, alongside HTML and JavaScript.
3. The term cascading comes when more than one style rule applies to an element, the priority system is used to determine which rule should be applied.[Wik22a]

- **How does CSS work?**

1. First, the HTML file would be loaded by the browser and then converted into DOM.
2. The resources that are linked to the HTML file document for example: embedded videos, images, and linked CSS, would be fetched.
3. The CSS fetched is then parsed by the browser, and it figures out which style is to be applied on which nodes in the DOM and attaches styles to them.
4. Then the layout structure should appear.
5. if the CSS is parsed successfully, the elements in the parsed CSS get styled immediately as soon as they are laid on the page.
6. if CSS is loaded late, elements are shown in their " unstyled form" until their corresponding styles are parsed.[Gee21]

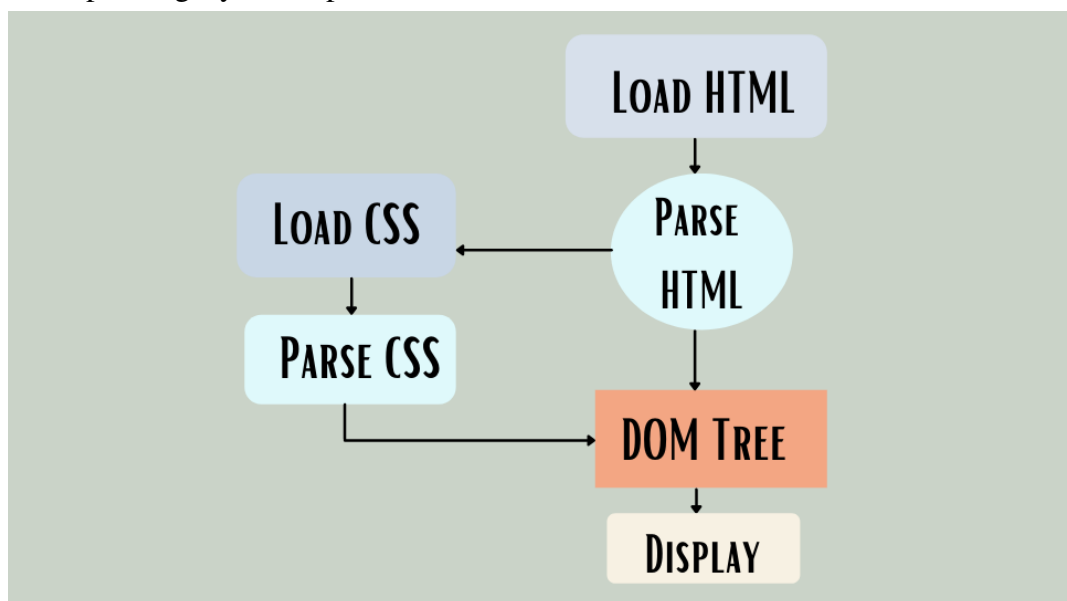


Figure 3.12: How CSS works in a simple manner

3.2.5 JavaScript:

- **History:[Wik01]**

1. Along with HTML and CSS, the computer language JavaScript, sometimes known as JS, is one of the foundational elements of the World Wide Web.
2. 98% of websites will utilise JavaScript on the client side by the year 2022 to control web page functionality, frequently integrating third-party libraries.
3. A dedicated JavaScript engine is available in every major web browser and is used to run the code on users' devices.
4. The programming language Java should not be confused with JavaScript. Although "Java" and "JavaScript" are trademarks (or registered trademarks) of Oracle and other nations, the syntax, semantics, and use cases of the two computer languages differ greatly.
5. JavaScript regulates how a website behaves.
6. JavaScript is used to generate interactive functionality and was created to alter web pages.
7. A website can still work without JavaScript, but only to a limited extent.
8. JavaScript is what makes HTML and CSS animated and gives life to your website.[Dev22]

- **How does JavaScript work:**

1. When we execute a JavaScript application within a web browser, the browser's engine receives the JavaScript code and executes the source code to produce the output.
2. As seen in the figure above, a normal JavaScript engine executes source code after going through a number of phases.[Jav22]
3. Let's examine each of these actions in further depth:
 - (a) **Parser:**

Every time we execute a JavaScript application, the "parser" inside the JS engine receives our code as the initial step of the engine. Because JavaScript is an interpretative programming language, it is the parser's responsibility to verify the code for syntactic mistakes line by line. If an error is found, the parser will throw an error and halt the execution of the code.
 - (b) **AST:**

After the parser verifies that there are no mistakes or errors in all of the JavaScript code, it constructs the AST data structure (Abstract Syntax Tree).
 - (c) **Conversion to Machine code.**
 - (d) **Machine code:**

the converted code is submitted to the system for execution. The system then executes the byte code.

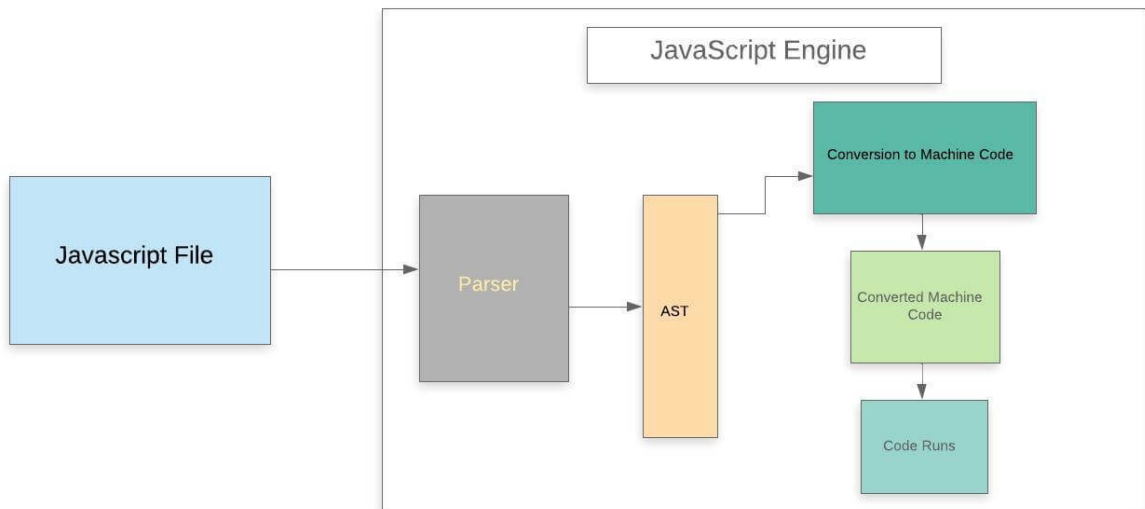


Figure 3.13: JavaScript Engine
Source: [Jav22]

3.2.6 Databases:

- A database is an organized collection of structured data and is often kept electronically in a computer system.
- A database management system often controls a database (DBMS).
- The term "database system," refers to the combination of the data, the DBMS, and the applications that are connected to it.
- To facilitate processing and data querying, the most popular types of databases now in use usually describe their data as rows and columns in a set of tables.
- The data may then be handled, updated, regulated, and structured with ease.
- For creating and querying data, most databases employ structured query language (SQL).[OCI20]

3.2.7 Some Types of databases:

1. Relational databases:

In the 1980s, relational databases became more popular. A relational database's items are arranged as a collection of tables with rows and columns. The most effective and adaptable method of gaining access to organised data is through relational database technology.

2. Object-oriented databases:

Similar to object-oriented programming, information is represented as objects in an object-oriented database.

3. Distributed databases:

Two or more files spread over several separate sites make up a distributed database. The database may be spread across many networks, housed on numerous computers, or situated in the same physical place.

4. Data warehouses:

A central repository for data, a data warehouse is a type of database specifically designed for fast query and analysis.

5. NoSQL databases:

Unstructured and semi-structured data can be stored and processed using a NoSQL database (in contrast to a relational database, which defines how all data inserted into the database must be composed).

With the proliferation and complexity of online applications, NoSQL databases gained popularity.

6. Cloud databases:

Any collection of data, whether organised or unstructured, that is housed on a private, public, or hybrid cloud computing platform is referred to as a cloud database.

Traditional and database as a service are the two different sorts of cloud database models (DBaaS).

With DBaaS (Database as a service), a service provider handles maintenance and administrative duties.

3.2.8 Database Management System (DBMS):

The relationship between a database, the DBMS, and the code of your website is depicted in the figure below:[M22]



Figure 3.14: DBMS
Source: [M22]

3.2.9 MySQL Database:

- An open-source relational database management system (RDBMS) is called MySQL.
- The acronym "SQL," which stands for "Structured Query Language," is combined with the names "My," the co-founder Michael Widenius's daughter's name, and "SQL," the the abbreviation for Structured Query Language.
- This Structured Language is used to manipulate, manage and retrieve data with the help of various Queries.
- A relational database arranges data into one or more tables where it is possible for the data to be connected to one another.
- The relational database's data may be created, modified, and extracted using the SQL programming language, which is also used to manage user access to the database.
- An RDBMS, such as MySQL, works with an operating system to implement a relational database in a computer's storage system, manages users, permits network access, and makes it easier to evaluate database integrity and create backups.

[Wik22c]

Chapter 4

Practical Part

- I will discuss how the taxation systems work in Czech republic, Germany and Egypt, by assuming the basic circumstances for individuals.
- As a result, the application would perform these calculations in accordance with the presumptions.

4.1 The following case study's underlying presumptions:

- A software engineer employee above 26 years old, so he is not a student.
- The amount of salary = 3000 Euro/month.
- He is a non-disabled individual.
- Unmarried.
- No children.

4.2 Personal income tax in Czech Republic:[A22b]

4.2.1 Tax Category:

The Czech Republic has reinstated progressive taxes category as of 2021.

4.2.2 Tax period:

Calendar year.

4.2.3 Tax Rates:

The Czech Republic has the following tiers of tax rates:

1. 15% is applied to monthly income up to CZK 155,644 (approx. EUR 5,986).
2. A tax rate of 23% is applied to income exceeding that amount for 2022.

4.2.4 Allowances:

1. Basic tax exemption:

- In 2022, the monthly basic personal tax exemption can be claimed in the amount of CZK 2,570

2. The contribution rates for the employee are:[PwC22a]

- 6.5% for social security and
- 4.5% for health insurance.

3. Dependent–spouse exemption:

- A resident taxpayer may claim an allowance of up to 2070 CZK monthly, if their spouse does not have an annual taxable income exceeding CZK 68,000.
- In the event that the husband is disabled, the standard dependent-spouse assistance is doubled.

4. Disability exemptions:

- Taxpayers with disabilities may apply an exemption annual amount from CZK 2,520 to CZK 16,140 , depending on the extent of the disability.

5. Students exemptions:

- exemption for students is CZK 4,020 up to 26 years of age.

6. Children tax exemptions:

- A tax credit is available to resident taxpayers for each kid residing in the same home as them.
- The sum is determined by the number of kids.
- For the first child, the annual tax allowance is CZK 15,204 (about 1267 monthly).
- for the second child, CZK 22,320 (about 1860 monthly)
- for any additional children, CZK 27,840 (about 2320 monthly).

4.3 The Tax equation for Czech Republic:

- In our case study, the salary amount would be the average of Software engineer jobs approx. = 3000 eur = CZK 70,627 per month.

The net salary = the gross + the fixed basic tax exemption - the income tax - the health insurance - the social insurance

Figure 4.1: Tax Equation in Czech Republic

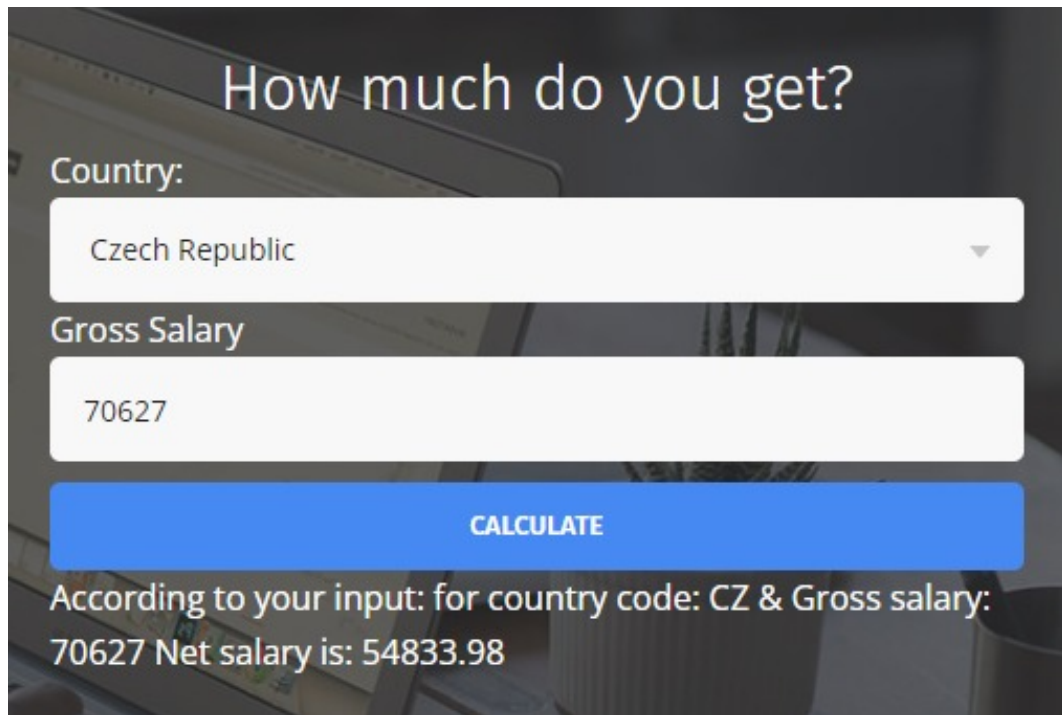
- We can get the income tax by multiplying the Gross and the tax rate according to the salary amount.
- the income tax = tax rate * the gross
- the health insurance = 0.045 * the gross
- The social insurance = 0.065 * the gross

$$\begin{aligned} \text{The net salary} &= 70,627 + 2,570 - (0.15 * 70,627) \\ &\quad - (0.045 * 70,627) - (0.065 * 70,627) \\ &= 73,197 - 10,594.05 - 3,178.215 - 4,590.755 \end{aligned}$$

$$\text{The net salary} = 54,833.98 \text{ czk} = \mathbf{2,253.62 \text{ Euro}}$$

Figure 4.2: Net Salary in Czech Republic

- As Shown in the figure below, the application acknowledges the results for Czech republic:



The screenshot shows a mobile application interface with the title "How much do you get?". It features a dropdown menu for "Country" set to "Czech Republic", a text input field for "Gross Salary" containing "70627", and a blue "CALCULATE" button. Below the button, the app displays the result: "According to your input: for country code: CZ & Gross salary: 70627 Net salary is: 54833.98".

Figure 4.3: Net Salary App in Cz

4.4 Personal income tax in Germany:

4.4.1 Tax Rates for 2022 per year:[W20a]

- 0 tax if the income Up to 9,408 Euro.
- 14% if the income range 9,409 - 57,051.
- 42% if the income range 57,052 - 270,500.
- 45% if the income range 270,501 and over.

4.4.2 Tax classes in Germany:[N22]

- The tax classes which are dependent on your marital status, your spouse's income, and the number of children you have, determine the tax rate of income tax.
- Your tax class determines how many paid days off and how much unemployment compensation you receive.
- Each employee is required to reveal their relationship to the German government.

1. Class-I:

Single, widowed, civil partnership, divorced, spouse living abroad or legally separated.

2. Class-II:

Single parents.

3. Class-III:

Recently widowed or married with a significantly larger income than the spouse (both working in Germany).

4. Class-IV:

Married, both spouses have a similar income.

5. Class-V:

Married with a significantly smaller income than the spouse.

6. Class-VI:

Workers with multiple employments.

Therefore, in our case study, I will use the Class-I in the calculations.

4.4.3 Tax Category:

Germany has a progressive taxation system.[rio22]

4.4.4 The income tax contributions for Class-I:

[Tax22a]

- The rate for public pension insurance = 9.35%
- Unemployment insurance = 1.2%
- health insurance = 7.3%

4.5 The Tax equation for Germany:

- The average salary amount for a Software engineer = 55000 Euro per year, = 4584 Euro/month.

The net salary = the gross - the income tax - the health insurance - the pension insurance - the unemployment insurance

Figure 4.4: Tax Equation in Germany

- The figure below confirms the results from the App

How much do you get?

Country:
Germany

Gross Salary
3000

CALCULATE

According to your input: for country code: DE & Gross salary: 3000 Net salary is: 2044.5

Figure 4.5: Net Salary from the Application in Germany

- The tax rate = 0.14
- The income tax = 0.14 * the gross

$$\begin{aligned} \text{The net salary} &= 3000 \text{ €} - (0.14 * 3000) - (0.073 * 3000) - (0.0935 * 3000) - (0.012 * 3000) \\ &= 3000 - 420 - 219 - 280.5 - 36 \end{aligned}$$

$$\text{The net salary in Germany} = 2044.5 \text{ €}$$

Figure 4.6: Net Salary in Germany

4.6 Personal income tax in Egypt:

4.6.1 Tax rates in Egypt for 2022 per year:[PwC22b]

Tax rates include social security as well.

1. 0 tax if the income Up to 587.06 Euro.
2. 2.5% if the income range 587.06 - 1,174.12
3. 10% if the income range 1,174.12 - 1,761.18
4. 15% if the income range 1,761.18 - 2,348.25
5. 20% if the income range 2,348.25 - 7,827.49
6. 22.5% if the income range 7,827.49 - 15,654.97
7. 25% if the income more than 15,654.97

4.7 The Tax equation for Egypt:

- The average monthly salary for a software engineer = 11000 EGP Approx. = 500 Euro/month
- 6000 Euro/year

The net salary = the gross - the income tax

Figure 4.7: Tax Equation in Egypt

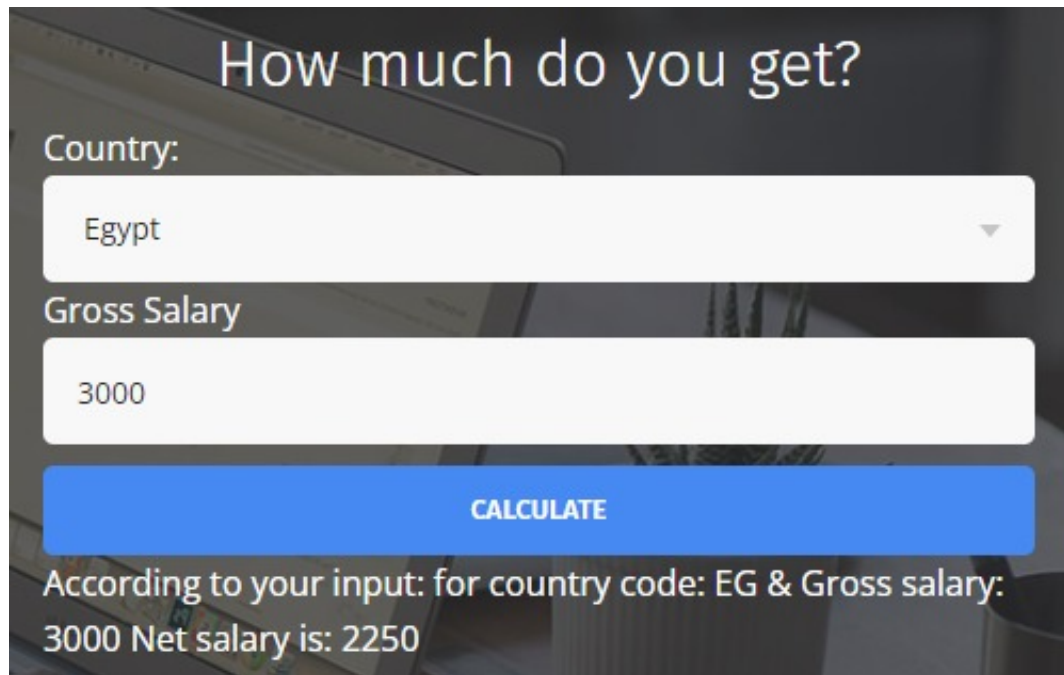
- The tax rate for tier number.5 = 20% per year.
- So the used tax rate/month = 0.017
- The income tax = the tax rate * the gross.

In our case study the net salary per month is 3000€ , so in Egypt the tax rate would be 25%.

$$\text{The net salary} = 3000\text{€} - (0.25 * 3000)$$

$$\text{The net salary in Egypt} = 2,250\text{€}$$

Figure 4.8: Net Salary in Egypt



The screenshot shows a web application interface with the title "How much do you get?". It features a "Country:" dropdown menu with "Egypt" selected, a "Gross Salary" input field containing "3000", and a blue "CALCULATE" button. Below the button, the output text reads: "According to your input: for country code: EG & Gross salary: 3000 Net salary is: 2250".

Figure 4.9: Net Salary from the application in Egypt

4.8 SDLC:[Ann21]

- The software industry uses the Software Development Life Cycle (SDLC) method to plan, create, and test high-quality software.
- The goal of the SDLC is to create high-quality software that meets or exceeds customer expectations while delivering on schedule and under budget.
- The SDLC is a framework that outlines the duties carried out at each stage of the software development cycle.
- The life cycle outlines an approach for enhancing both the general software development process and the quality of the final product.

4.8.1 SDLC Stages:

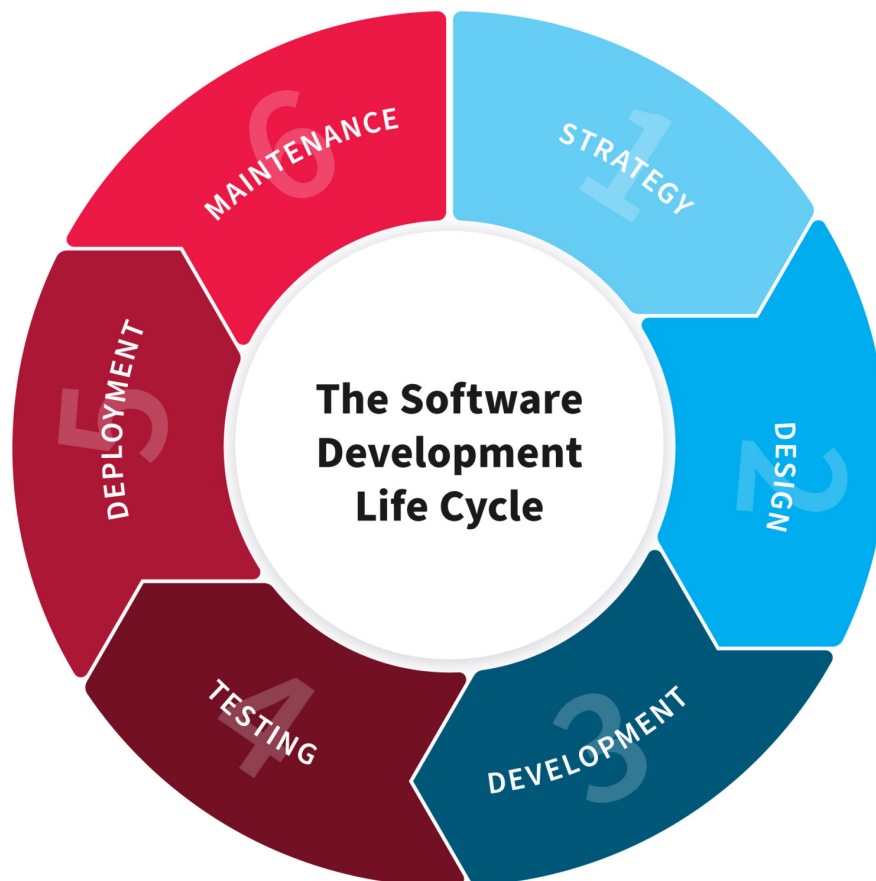


Figure 4.10: SDLC Stages
Source: [Ann21]

1. Strategy (Planning and Requirement Analysis):

- The first stage of the SDLC begins with the definition of the system's requirements, goals, objectives, and the issues that the future system must address.
- It's important to identify the target audience.

2. Design (Designing the Product Architecture):

- Following completion of the requirement study, the next stage is to properly describe and record the product needs and obtain customer or market analyst approval.
- This stage focuses on the software design and how it integrates with the technical and functional requirements of the system to determine how the system will perform.
- The team responsible for developing the software defines the user interface and specifies the requirements.
- The team creates a system architecture as part of the design stage to aid in conceptual understanding and gets the UI/UX ready for production by creating wire frames, concepts, and prototypes.
- In this step, the software platforms and established programming languages are also considered.
- Determining a plan to support online goods across a range of devices while guaranteeing responsive design is crucial.

3. Development (Building or Developing the Product):

- The software engineering team constructs the complete system at this SDLC stage by developing code utilising the selected technologies.
- The team chooses frameworks, libraries, and commercially available solutions based on the technology to be used, establishes storage places (repositories), executes integrations with other systems, and converts software specifications into a usable and dependable solution.
- The programming code is created in accordance with DDS(Design Document Specification).
- Code generation may be completed quickly if the design is done in a systematic and accurate manner.
- Programming tools including compilers, interpreters, debuggers, and other similar tools are used to produce the code, and developers must adhere to the coding standards established by their business.
- Different high level programming languages are used for coding, including C, C++, Pascal, Java, and PHP. The sort of software being produced affects the choice of programming language.

4. Testing:

- This stage is typically a subset of all the stages.
- It simply relates to the product's testing phase, during which product flaws are discovered, monitored, corrected, and retested until the product satisfies the SRS's (Software Requirement Specification) quality requirements.
- Software engineers might find flaws and issues at this stage and correct them to make sure the product adheres to the original requirements.
- It is important to examine how well the application's various components function together.
- During the testing phase of the software development life cycle, problems that consumers can face are minimised and smooth performance is guaranteed, increasing user satisfaction.
- This step is also used to identify any weaknesses and guarantee the security and dependability of the program.

5. Deployment:

- The product is formally released in the relevant market once it has accomplished testing and is prepared for deployment.
- All procedures that guarantee a software system or upgrade is accessible to users are included in software deployment.
- Software release, installation, testing, deployment, and performance monitoring are typically included.
- Depending on the organization's business plan, product deployment may occasionally take place in phases.
- The development team delivers the completed product to the client at the conclusion of this phase.
- Make sure your team has sufficient resources and time to test everything while you are still in the active development phase since after you go into the maintenance phase, large changes will move considerably more slowly and take much longer to complete.

6. Promotion and Marketing:

- Making sure the intended audience is aware of your new offering is crucial.
- Advertising, SEO, direct social media, email marketing campaigns, and other promotional activities must all be handled for a launch to be effective.
- Your employees of an organization, a third-party marketing firm, or knowledgeable suppliers who offer a full-cycle development encompassing marketing and SEO operations to ensure product recognition can handle marketing activities.

7. Maintenance:

- After a product is launched onto the market, maintenance is carried out for the clients already in place.
- The development team responds to comments, feedback, fixes issues that users or stakeholders find, and offers continual improvements.
- In order to stay competitive and maintain high user engagement and happiness, it is crucial to offer continual enhancements and expand the software's capability given the market's constant change.

Chapter 5

Discussion of Results and Recommendations

5.1 Discussion of Results:

First of all I will demonstrate another term that's would affect the user's decision of choosing the suitable country whether to live in, or to start a corporate there:

- **Standard of living:** [Inv22e]
 - The availability of both quantity and quality material goods and services to a certain community is referred to as the standard of living.
 - The typical person's material well-being in a specific demographic is referred to as their standard of living.
 - Focus is placed on the most fundamental material aspects of existence, such as income and life expectancy. It is closely connected to quality of life, which may also examine elements like climate, levels of infrastructure, public safety, access to healthcare services, and environmental quality.

- After analysing the previous case study results:

Salary 3000€	Czech Republic	Germany	Egypt
Total Tax	755.09 €	955.5€	750€
Net salary	2,253.62 €	2044.5 €	2,250€
Standard of Living/person/month without rent	642.34€	934 €	319.07€

Figure 5.1: Results Comparison

- Despite the fact that the tax rate in Egypt is the lowest and the user would think that it's better to live in, unless Standard of living has the lowest level among the rest of the countries, that means the income compared to the expenses is very low, beside you will not get the good quality of the life basics.

5.2 Recommendations:

According to the case study results in case of standardisation of circumstances for being a software engineer, single and a foreigner in the 3 countries.

We will notice the following:

- The employee would get much income if he is located in Czech republic with an acceptable standard of living.
- Meanwhile with the same skills and circumstances in Germany He will get less income, however, in case of having a family or kids , the individual will get more tax reliefs.
- However in Egypt the income will be the same regardless of any other circumstances whether a family or having a disability situation.
- Consequently, the individual will spend more than in the case of getting less income with more privileges such as allowances and tax reliefs, beside the society's high living standard and facilities.

Chapter 6

Conclusion

The main objective of the thesis was to create a web application that would calculate the income tax for individuals in some specific countries which means using different taxation systems for the calculations.

The first step of the practical part shows how the income tax system is working in Czechia, Germany and Egypt. in addition to presenting the benefits that each individual would gain from each country's taxation system depending on some conditions.

The practical part as well explained how subsystems such as social and health circumstances could increase or decrease the tax amount according to the country's system, and as a result of that, the employee would decide which country is more suitable to his needs and essentials.

In terms of the software, SDLC helped me to develop the software with the lowest cost, simple presentation and in the shortest time.

Eventually the thesis would leave the final decision for individuals themselves, through providing a simple brief of the taxation system specifics, presenting the most important taxing fields and explaining the terminologies in a comprehensible way.

The research as well may be expanded upon to add more countries, that would lead to add more taxing terms, add a new section for corporate, and create profiles/accounts to keep the user's data.

Chapter 7

Appendix

7.1 The Back-end PHP source Code

7.1.1 PHP-code-1

```
<?php

// require_once("./scripts.php");
$gross = isset($_POST['gSalary']) ? $_POST['gSalary'] : 0;
$country = isset($_POST['countryCode']) ? $_POST['country'] : "CZ";

?>
<!DOCTYPE html>
```

Figure 7.1: PHP file - 1

7.1.2 PHP-code-2

```
<?php
function GetTaxes($gross, $country)
{
    $gross = isset($_POST['gSalary']) ? $_POST['gSalary'] : 0;
    $country = isset($_POST['countryCode']) ? $_POST['country'] : "CZ";

    // <!-- to get each country net salary -->
    if ($country == "CZ") {
        $tax_rate = 0.15;
        $income_tax = $tax_rate * $gross;
        $health_insurance = 0.045 * $gross;
        $social_insurance = 0.065 * $gross;
        // <!-- pension_benefit -->
        $tax_benefit = 2570;
        // <!-- benefit is in czk per month -->
        $net = $gross + $tax_benefit - $income_tax - $health_insurance - $social_insurance;
    } else if ($country == "DE") {
        $tax_rate = 0.14;
        $income_tax = $tax_rate * $gross;
        $net = $gross - $income_tax;
        // - $health_insurance - $pension - $unemployment_insurance;
    } else if ($country == "EG") {
        $tax_rate = 0.025;
        $income_tax = $tax_rate * $gross;
        $net = $gross - $income_tax;
    }
    return "for country code: " . $country . " & Gross salary: " . $gross . " Net salary is: " . $net;
}
?>
```

Figure 7.2: PHP file - 2

7.2 Front-End source Code

```
<form action="/" method="POST" class="formFields">
  <div class="fields" id="field_1-1">
    <label for="country">Country:</label>
    <br>
    <select id="country" name="country" class="field large">
      <option value="CZ">Czech Republic</option>
      <option value="DE">Germany</option>
      <option value="EG">Egypt</option>
    </select>
    <input type="hidden" id="countryCode" name="countryCode" value="<?php echo $country; ?>">
    <br>
  </div>
  <div class="fields" id="field_1-2">
    <label>Gross Salary</label>
    <div class="dfield">
      <input id="gSalary" name="gSalary" class="field large" type="text" value="<?php echo $gross; ?>">
      <span class="uh"></span>
    </div>
    <div class="clearer"></div>
  </div>
  <div class="fields" id="field_1-3">
    <input type="submit" value="Calculate" class="pbSubmit">
  </div>
</form>
<div class="fields" id="field_1-4">
  <label><?php echo "According to your input: " . GetTaxes($gross, $country) ?></label>
</div>
```

Figure 7.3: Front-end HTML file

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