Assignments

CS 413: Software Systems Laboratory

Spring 2020

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LaTeX[1]

Create a LaTeX document (of `article` type), including the following aspects.

- Table of contents
- List of figures
- List of tables
- Title
- Author
- Affiliation
- Email
- Date
- References (at least 5)
- Figures
- Tables (include multi-column and multi-row cells)
- Comments
- Multiple sections
    - One mathematical section, including:
        - Inline mathematical expression
        - Non-numbered equation in dedicated line
        - Numbered equation in dedicated line
        - Multiline equation
        - Matrices
        - Square root
        - Summation
        - Integration
        - Nested brackets (with varying sizes)
        - Fractions
- Font styles (bold, italics, teletype fonts, etc.)
- Color (text color, text background, page color)
- Lists (itemize, enumerate, description)
- Cross referencing of sections, tables, figures and equations
- Pseudo code of quick sort algorithm

What to submit?

- Please zip all your files, and submit a single file named "*<roll-no>*_Ass1.zip", where *<roll-no>* should be replaced with your IIT Dharwad roll number.

[1] Please ignore the LaTeX assignment mentioned in lecture 2.

Beamer

Create a beamer presentation, including the following aspects.

- Title page
- Overlays
    - Stepwise viewing
        - use both `pause` and `onslide` commands
        - both for lists and otherwise (blocks, columns, figures, tables or just sentences)
    - Replace (use at least two commands among `only, uncover, visible, invisible, alt temporal`)
    - Highlighting (use both `alert, color`)
- Hyperlinks (to a URL, as well as to another slide)
- Structures (columns, blocks)
- Figures
- Tables
- Transitions
- Maths
    - Theorem/Proof environments
    - Multiline equation (stepwise viewing)
- Lists (itemize, enumerate, description)

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HTML

Create a webpage demonstrating creative use of each of the following HTML elements.

- Elements, Tags and Attributes
- Formatting Tags
- Styles and CSS
- Lists
- Tables
- Phrase Tags
- Doctype and Head Section
- Embedding Images
- Embedding Audio and Video
- Block Elements and Layouts
- Forms

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Javascript

1. Develop a web-page for Drivers License Eligibility Check, with the following HTML form elements:
    - Age (text box)
    - Submit (button)

    On clicking submit button, perform the following tasks:

    a) If the age does not lie between the interval 18 to 100, display a suitable error message
    b) If constraint is satisfied, display a suitable success message such as: **You are eligible!**

2. Develop a web-page using javascript to do the following:
    a. `palindrome.html`
        - Accept a string through a form and declares if it's a palindrome.
    b. `gcd.html`
        - Compute `gcd` of two numbers input through a form, and display it.
    c. `fibonacci.html`
        - Accept an integer n, then generate first n Fibonacci numbers.

3. Create a webpage that takes a string as input, on button click, computes the most frequently occurring character and displays the output in the following format:
    - Input
        - $a, b, a, c, a, g, a, d, a, r, a, f, a, u$
    - Output
        - Most Frequent character: a
        - Number of occurrences: 7
4. Develop a web-page to perform the following:
    (a) Accept the details of the User: Name, Address, Phone Number, Email ID, Educational Qualifications, Age, using suitable input elements.
    (b) On clicking submit button, call function `display`().
    (c) Design the function `display`() such that, it will show the submitted information in a table, in the following format:

User.Name	Kumar
User.Address	FirstStreet
User.Phone Number	9876543210
User.EmailID	kumar@gmail.com
User.Educational Qualifications	B.Tech
User.Age	19

    Create class User with properties and function `display`().

What to submit?

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PHP

Create a photo album with following features.

- Login Form: `index.php` has the form, `login.php` has authentication
  Authenticate using standard credentials:
  - user: eval
  - pass: eva
- `album.php`: Browsing through the album using next, prev, last, first buttons
  Image upload page that allows you to add an image to the album:
- `newupload.php` has the form and upload.php does the processing:
  - Check for image format as `jpg` in `php`
  - Check for image size to be less than 200 KB in `php`
  - Maximum of 10 images to upload- check in `php`
  - Images to be uploaded to images/ directory
  - Errors can be displayed on `upload.php` itself with a back button to enable navigation to the previous page
  - Deleting images

  We expect `index.php`, `login.php`, `upload.php`, `newupload.php` in the directory.
- Optional (not for credit): Use sessions to validate login sessions while accessing `album.php`, `newupload.php` and `upload.php`. Session has to be initialized at login.

What to submit?

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SQL

Create a database called `publications`, with two tables – `authors` and `titles`.

Table `authors` will have following schema.

Field	Type	Null	Key	Default	Extra
author	varchar(120)	YES		NOT NULL	
publisher	varchar(30)	YES		NULL	

Table `titles` will have following schema.

Field	Type	Null	Key	Default	Extra
title	varchar(120)	YES		NOT NULL	
author	varchar(120)	YES		NULL	
year	smallint(6)	YES		NULL	

Write a PHP program in which you communicate with this database and have following functionalities:

1. Display all the records in both the tables.
2. Adding a record (available for both the tables).
3. Deleting a record (available for both the tables).
4. Updating year of publication for a given title.
    - It might be possible that user might submit a substring of title.
5. Given a book find its author and year of publication.
    - It might be possible that user might submit a substring in the book.
6. Given a publisher – find all the books (names of the books) which authors from that publisher have published, publication year.
    - i.e., publisher wise listing of books, authors along with publication year
7. When you are updating/adding please do the data type check (i.e. for (2)-(4)).

Python

1. Create a function `randGen()` to generate a 10,000-line file `dataset.txt`, each line of which is as per the following format

<age>, <gender>, <state>, <phone number>, <height>, <weight>

and the corresponding data is to be generated as described below.

- Age (uniformly distributed integer between 1 and 100)
- Gender (randomly marked as Male or Female)
- State (randomly chosen from the 28 states of India)
- Phone number (random 10-digit numbers starting with 6, 7, 8 or 9)
- Height (Gaussian distributed real number with mean 160 cm and deviation 10 cm)
- Weight (Gaussian distributed real number with mean 70 kg and deviation 5 kg)

2. Create a `Person` class, with the following attributes: `Age`, `Gender`, `State`, `Phone number`, `Height`, `Weight`.

3. Generate 10000 instances of the Person class with data read from `dataset.txt`.

4. Calculate the average height and weight of the dataset and append to `dataset.txt`.

5. Based on the dataset, create the following charts and save them as follows.

- `height.jpg` including two subplots, namely, histogram of male and female heights
- `weight.jpg` including two subplots, namely, histogram of male and female weights
- `gender.jpg` – pie chart of male and female gender
- `phone.jpg` – pie chart of numbers starting with 6, 7, 8 and 9
- `age.jpg` – two line plots (with legend) of cumulative distribution function of male age and female age
- `state.jpg` – bar plot with state name on x-axis and number of people in that state (based on the dataset) as the bar height

What to submit?

- *<roll-no>*.py, where *<roll-no>* should be replaced with your IIT Dharwad roll number.
- It should include all function definitions, class definitions, and the main program.

Git

Linux

AWK

Bash