华中师范大学伍伦贡联合研究院
Central China Normal University Wollongong Joint Institute

UNIVERSITY
OF WOLLONGONG
AUSTRALIA

CSIT884
Web Development

Lecture 12 – Client-Side Storage

Lecture slides are mainly taken from UOW

Client-Side Web Storage

- Store data on the client side, instead of the server
- Make the web application available offline
- The storage is per origin (protocol + domain + port)
- Simple storage: data is stored in name/value pair

2 types of storage:

- **localStorage**: a single persistent object which stores data with no expiration date
- **sessionStorage**: stores data for one session only, data is cleared when the browser tab is closed.

Client-Side Web Storage

Checking if the browser supports web storage or not:

```
// return true if local storage is supported

// otherwise return false

function storageSupported(){

 if (typeof(Storage) !== "undefined") {

   return true;

 } else {

   return false;

 }

}
```

Client-Side Web Storage

Storing and retrieving data from Web Storage:

```
// storing data to the localStorage

localStorage.setItem("the-key", "the-value");

// get data from localStorage

var the-value = localStorage.getItem("the-key");
```

Removing data from Web Storage:

```
// removing data to the localStorage

localStorage.removeItem("the-key");
```

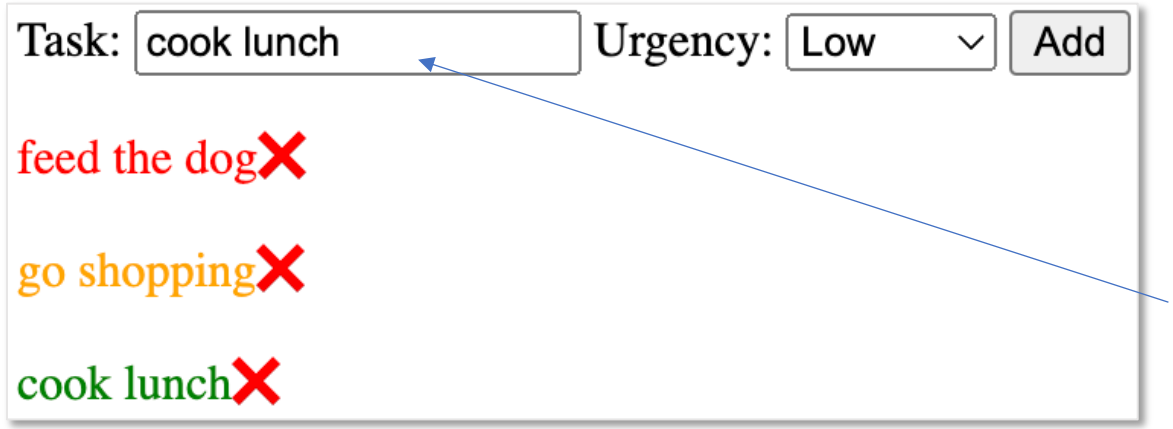
Example: To-Do-List

We want to create a web application where the user can create a to-do-list and save it to the local storage.

We will store the JSON of the task list into the local storage.

Example: To-Do-List

Design the HTML elements

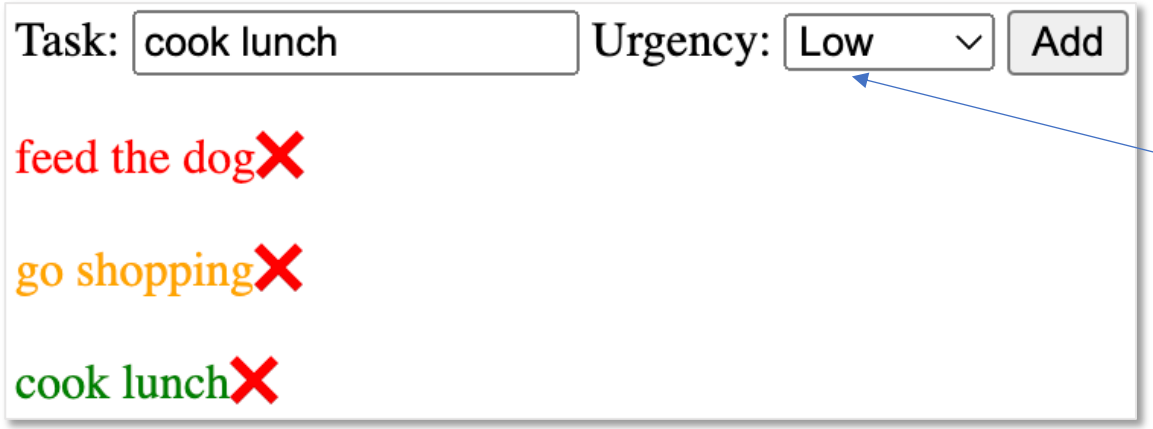


a text field for user to enter task description

```
<input type="text" id="task" />
```

Example: To-Do-List

Design the HTML elements



a selection for user to select task urgency

```
<select id="urgency">
 <option value="High">High</option>
 <option value="Medium">Medium</option>
 <option value="Low"
selected="selected">Low</option>
</select>
```

Example: To-Do-List

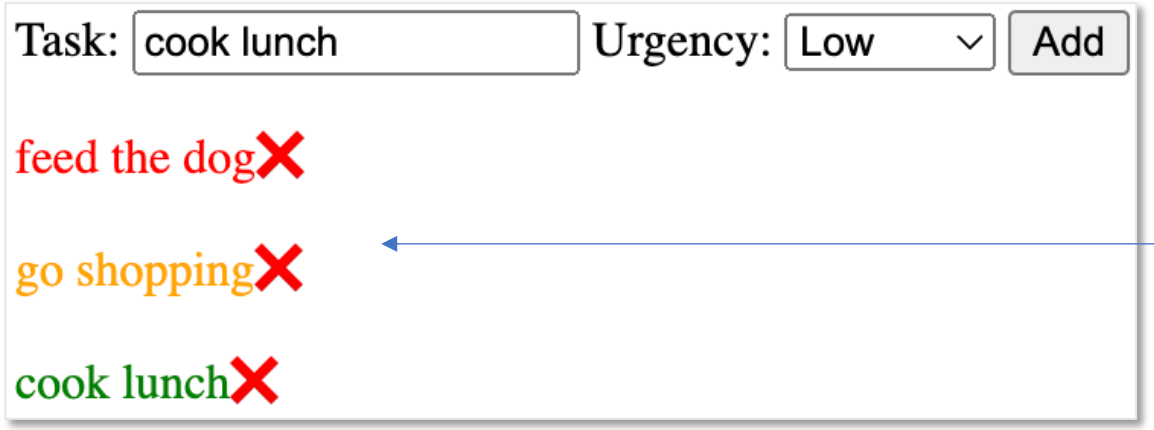
Design the HTML elements

a button to add task

```
<button onClick="addTask()">
  Add
</button>
```

Example: To-Do-List

Design the HTML elements



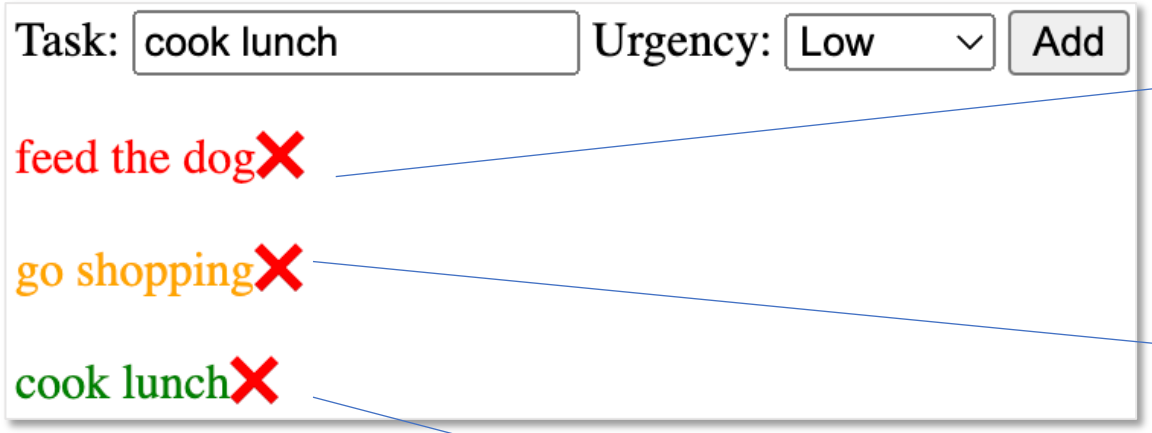
a div to display all the tasks

```
<div id="taskDisplay">

</div>
```

Example: To-Do-List

Design the data structure

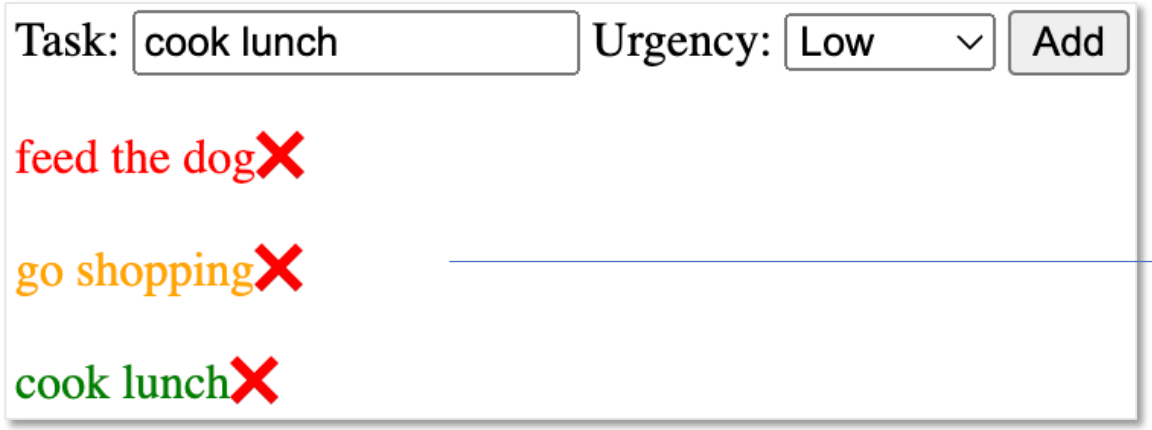



```
{
 id:12345xxx...,
 task:"feed the dog",
 urgency:"High"
}
{
 id:yyy...,
 task:"go shopping",
 urgency:"Medium"
}
{
 id:zzz...,
 task:"cook lunch",
 urgency:"Low"
}
```

each task is an object

Example: To-Do-List

Design the data structure

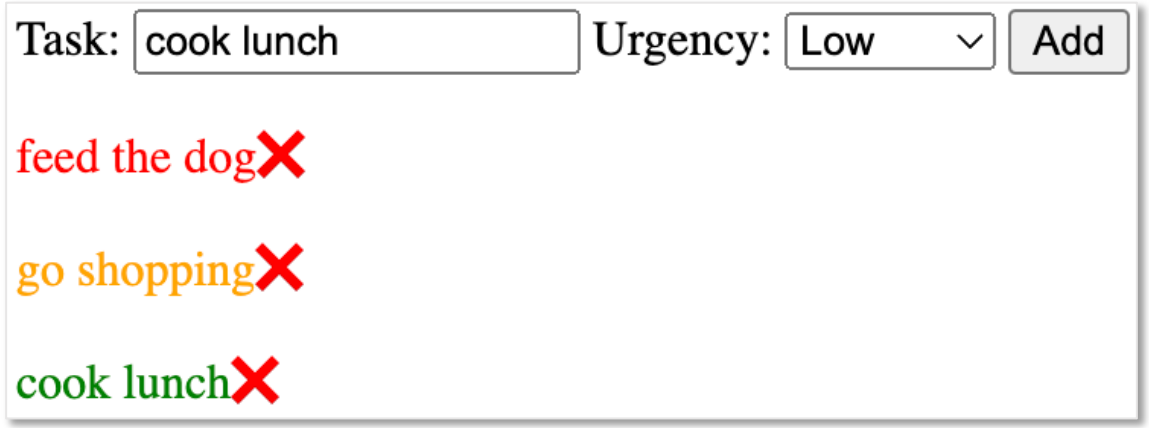


store all tasks into an array variable

```
[
 {
  id:12345xxx...,
  task:"feed the dog",
  urgency:"High"
 },
 {
  id:yyy...,
  task:"go shopping",
  urgency:"Medium"
 },
 {
  id:zzz...,
  task:"cook lunch",
  urgency:"Low"
 }
]
```

Example: To-Do-List

Design the data structure



store all tasks into an array variable

```
// list of tasks
// each task is an object that contains:
// {
//   id: the task id (the time when task created)
//   task: the task name
//   urgency: the task urgency (High, Medium, or Low)
// }
var toDoList = [];
```

Example: To-Do-List

Design the local storage

translate task array into JSON string

toDoList

```
[
 {
  id:12345xxx...,
  task:"feed the dog",
  urgency:"High"
 },
 {
  id:yyy...,
  task:"go shopping",
  urgency:"Medium"
 },
 {
  id:zzz...,
  task:"cook lunch",
  urgency:"Low"
 }
]
```

toDoListJSON

```
[
 {
 "id":12345xxx...,
 "task":"feed the dog",
 "urgency":"High"
 },
 {
 "id":yyy...,
 "task":"go shopping",
 "urgency":"Medium"
 },
 {
 "id":zzz...,
 "task":"cook lunch",
 "urgency":"Low"
 }
]
```

Example: To-Do-List

Design the local storage

store JSON string into local storage

toDoListJSON

```
[
 {
 "id":12345xxx...,
 "task":"feed the dog",
 "urgency":"High"
 },
 {
 "id":yyy...,
 "task":"go shopping",
 "urgency":"Medium"
 },
 {
 "id":zzz...,
 "task":"cook lunch",
 "urgency":"Low"
 }
]
```

Key	Value
toDoListJSON	[{"id":1605572931427, "task":"feed the dog", "urgency":"High"},...]

Example: To-Do-List

Function: Add a task


```
get task info from user and create task object
                    toDoList
add task object to the list of tasks

display updated list of tasks

store updated list of tasks into local storage
```

```
<div id="taskDisplay">

</div>
```

Key	Value
toDoListJSON	[{"id":1605572931427, "task":"feed the dog", "urgency":"High"},...]

Example: To-Do-List

Function: Add a task


```
function addTask(){
 // get task info from user and create task object
 var taskObj = createTask();
 // add task object to the list of tasks
 toDoList.push(taskObj);
 // display updated list of tasks
 displayTasks();
 // store updated list of tasks into local storage
 saveTasksToLocal();
}
```

Example: To-Do-List

Function: Create a task


```
function createTask(){
 // get task info from user
 var taskTf = document.getElementById("task");
 var taskName = taskTf.value;

 var urgencySelect = document.getElementById("urgency");
 var taskUrgency = urgencySelect.value;
 // create task object
 var taskObj = {};
 var currentDate = new Date();
 taskObj.id = currentDate.getTime();
 taskObj.task = taskName;
 taskObj.urgency = taskUrgency;
 // return task object
 return taskObj;
}
```

Example: To-Do-List

Function: Display tasks


```
function displayTasks(){
 // construct the html contains all the tasks
 var html = "";

 // use for loop to go through all the tasks
 for(var i=0; i < toDoList.length; i++){
  var taskObj = toDoList[i];
  var taskHTML = getTaskHTML(taskObj);
  html = html + taskHTML;
 }
 // display tasks in the DIV
 var displayDiv = document.getElementById("taskDisplay");
 displayDiv.innerHTML = html;
}
```

Example: To-Do-List

Function: Display tasks


```
function getTaskHTML(taskObj){
 // construct the html for displaying the task
 var html = "<p>";
 // task description in color
 var taskDesc = getTaskDescriptionHTML(taskObj);
 html += taskDesc;
 // task button
 var taskButton = getTaskDeleteButtonHTML(taskObj);
 html += taskButton;
 html += "</p>";
 return html;
}
```

Example: To-Do-List

Function: Display tasks

```
function getTaskDescriptionHTML(taskObj){
 // using different color for the urgency
 var desc = "";
 if (taskObj.urgency == "High"){
   desc = "<span style='color:red;'>" + taskObj.task + "</span>";
 }
 else if (taskObj.urgency == "Medium"){
   desc = "<span style='color:orange;'>" + taskObj.task + "</span>";
 }
 else if (taskObj.urgency == "Low"){
   desc = "<span style='color:green;'>" + taskObj.task + "</span>";
 }
 return desc;
}
```

Example: To-Do-List

Function: Display tasks


```
function getTaskDeleteButtonHTML(taskObj){
 var deleteEmoji = "&#10060;";
 var deleteButton = "<span onClick='deleteTask(" + taskObj.id + ")'>"
 + deleteEmoji + "</span>";
 return deleteButton;
}

function deleteTask(taskId){
 ...
}
```

Example: To-Do-List

Function: Delete a task


```
toDoList
remove task object from the list of tasks
display updated list of tasks
store updated list of tasks into local storage
```

```
<div id="taskDisplay">

</div>
```

Key	Value
toDoListJSON	[{"id":1605572931427, "task":"feed the dog", "urgency":"High"},...]

Example: To-Do-List

Function: Delete a task

```
function deleteTask(taskId){
 // remove task object from the list of tasks
 // search for task id
 for(var i=0; i < toDoList.length; i++){
   var taskObj = toDoList[i];
   if (taskObj.id == taskId){
     // delete task out of the task array
     toDoList.splice(i, 1);
   }
 }
 // display updated list of tasks
 displayTasks();
 // store updated list of tasks into local storage
 saveTasksToLocal();
}
```

Example: To-Do-List

Function: Save tasks to local storage

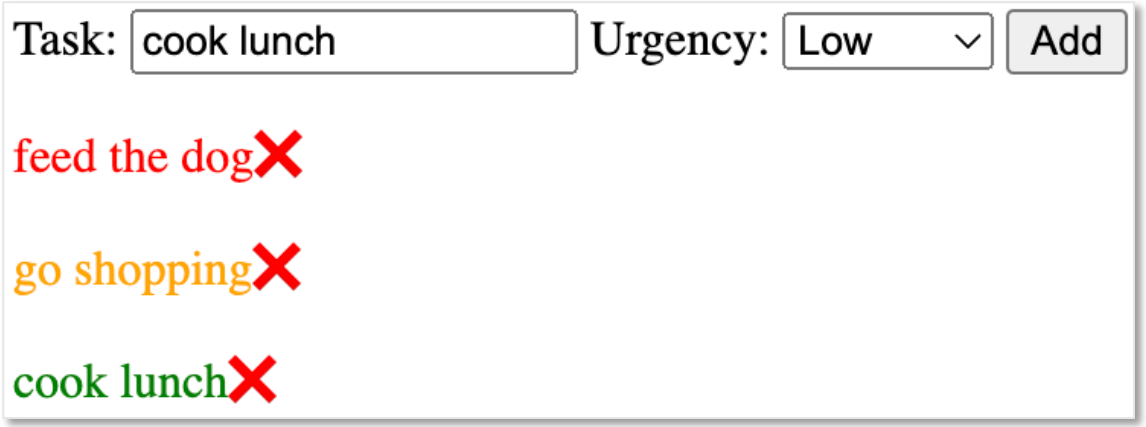
`toDoList`

↓ `translate task array into JSON string`

`toDoListJSON`

↓ `store JSON string into local storage`

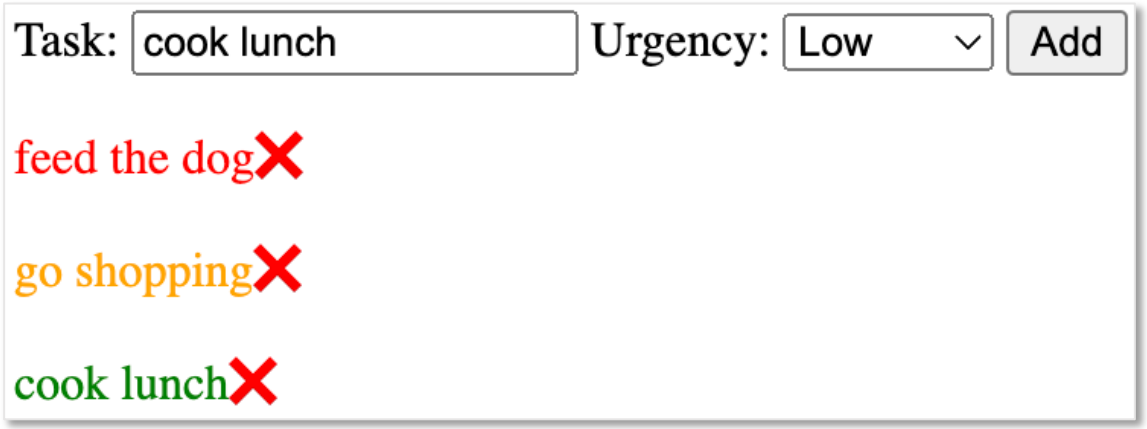
Key	Value
`toDoListJSON`	`[{"id":1605572931427, "task":"feed the dog", "urgency":"High"},...]`



Example: To-Do-List

Function: Save tasks to local storage

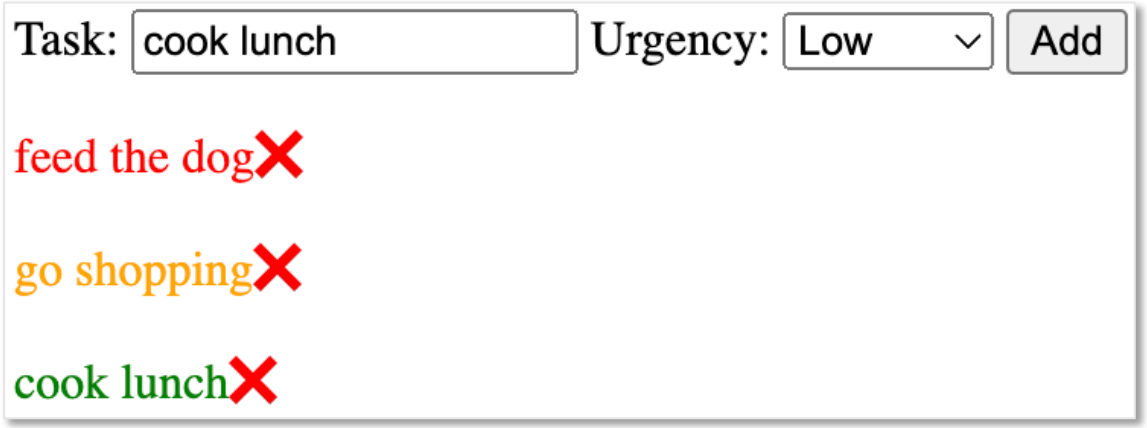
```
function saveTasksToLocal(){
 // check if local storage supported
 if(storageSupported()){
  // translate task array into JSON string
  var toDoListJSON = JSON.stringify(toDoList);
  // store JSON string into local storage
  localStorage.setItem( "toDoListJSON" , toDoListJSON);
 }
}
```



Example: To-Do-List

Function: Save tasks to local storage

```
// return true if local storage is supported
// otherwise return false
function storageSupported(){
 if (typeof(Storage) !== "undefined") {
   return true;
 } else {
   return false;
 }
}
```



Example: To-Do-List

Function: Load tasks

What happens when the user closes the website and then comes back on another day?

Example: To-Do-List

Function: Load tasks

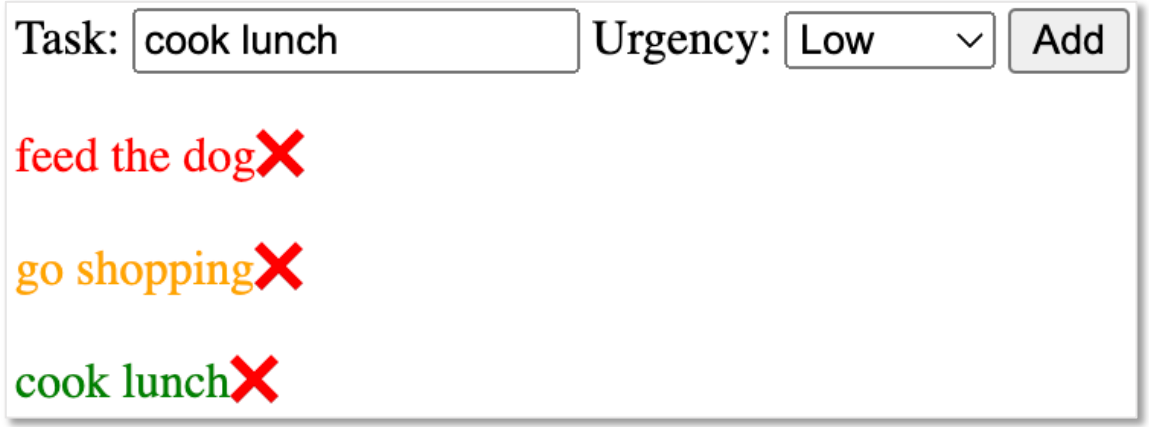
What happens when the user closes the website and then comes back on another day?

When the website loaded, we need to read the local storage for the saved list of tasks and then we need to display this saved list of tasks.

Example: To-Do-List

Function: Load tasks

Key	Value
toDoListJSON	[{"id":1605572931427, "task":"feed the dog", "urgency":"High"},...]



read saved JSON from local storage

toDoListJSON

translate JSON string to task array

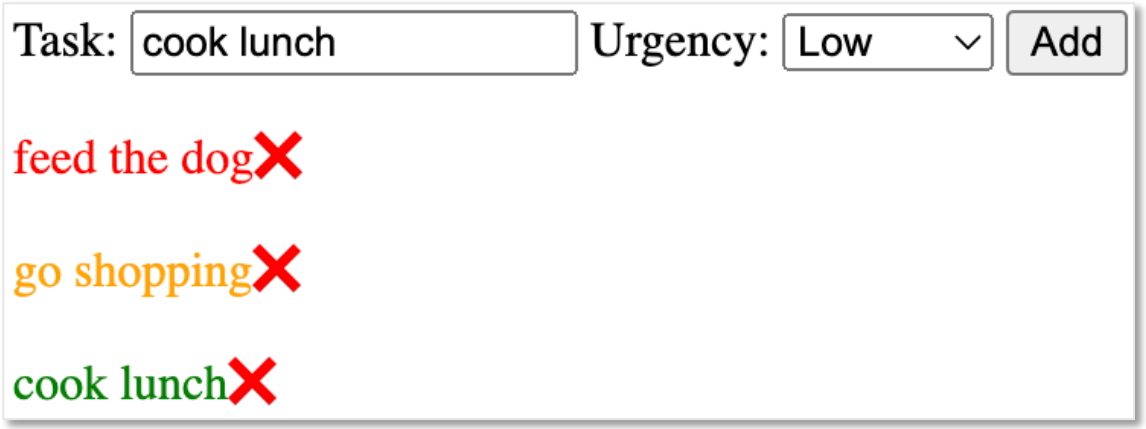
toDoList

display list of tasks

```
<div id="taskDisplay">

</div>
```

Example: To-Do-List



Function: Load tasks

```
<body onLoad="loadTasks()">

function loadTasks(){
 // check if local storage supported
 if(storageSupported()){
   // read saved JSON from local storage
   var toDoListJSON = localStorage.getItem("toDoListJSON");
   // translate JSON string to task array
   if(toDoListJSON != null){
      toDoList = JSON.parse(toDoListJSON);
   }
   // display list of tasks
   displayTasks();
 }
}
```

References

- https://www.w3.org/TR/webstorage/
- https://developer.mozilla.org/en-US/docs/Web/API/Web_Storage_API