

# How?

Node JS and Node Webkit make up the bulk of the technology used to create the bot that automatically finds and downloads each SDS. Using user input and the respective administrator's website to validate the input and authenticate the user's identity, the application can be used by any CEMS website to keep the database current. By using the CEMS website itself, the MySQL database of each site is kept safe with no chance of tampering.

The Node technology was used to create the application because it allows the tool to be cross-platform and used by any database administrator, regardless of what computer they choose to work on. Its simple design allows HTML and Javascript to be the lifeblood of the program and remain easy to modify, upgrade and otherwise change as programmers come into and leave the project.

Node also allows code to emulate the actions of actual users, which allows the tool to look like a normal user from the manufacturer server's point of view. This keeps the database administrators safe from overloading the servers with requests and becoming blacklisted; because the application only sends one request at a time along with short timers, it appears to be a particularly quick user and nothing more.

## A Step-By-Step Look:

1. User enters their information and specifies a path in which to download the SDSs to. If this path cannot be found, an error is thrown and the user is asked to try again.
2. Once submitted, the tool accesses the specified CEMS site and attempts to log in. If the attempt is unsuccessful, an error is thrown and the user is asked to try again.
3. After a successful login, the website is queried for the information needed to fetch the SDSs. This information includes a list of all chemicals in the database with missing or outdated SDSs, along with the manufacturer and product number of each chemical. A list of these chemicals is displayed for verification before proceeding.
4. After the user clicks continue, the downloading process begins. If the manufacturer of the chemical is recognized, the application accesses the manufacturer's site and searches for either the chemical's product number or name, depending on if the product number is available. Currently, the top four manufacturers in UNH's CEMS database are recognized. More will be added in the future. When searching for the PDF, if the search yields more than one result, the chemical is added to the "failed" list with the reason listed as, "multiple results found." Similarly, the chemical is added to the "failed" list with, "no results found" as the reason for failure if there are no results. If the manufacturer is not recognized, the chemical is added to the "failed" list with the reason listed as, "unknown manufacturer."
5. If the application gets one result while searching for the chemical, it attempts to download the PDF. If the attempt was successful, the chemical is added to the "success" list to be uploaded later. If the attempt was unsuccessful, the chemical is added to the "failed" list with the reason for failure listed.
6. After searching for each chemical, the application sequentially uploads each PDF from the "success" list. If any of these fail, the failure is noted and the uploads continue.
7. At the end of this, a final alert is shown to the user that states how many PDFs were uploaded out of the total number of PDFs that were downloaded. At this time, the user may look at the failed and succeeded chemicals in each respective list and, by clicking on a failed chemical, view the details of the chemical and have the option to modify it or view the search results. If the search came up with more than one result, this can be useful for choosing the correct PDF and then manually uploading it.

# Why?

OSHA requires that every institution in possession of potentially hazardous chemicals provide a material safety data sheet (SDS) for each chemical on the premise. This SDS needs to be easily accessible and up-to-date, and when a university of UNH's size can easily utilize more than one thousand chemicals, the job of keeping each SDS available and current is one that costs countless hours of manpower and wages per year. Many chemicals may not have any SDS available, let alone an outdated one, and so in order to avoid fines from OSHA, time, money and effort must be spent finding and uploading these SDSs.

The process of downloading and uploading the SDSs, normally in PDF format, is slow and tedious; the user must navigate to the chemical manufacturer's website, search for the product number or name of the chemical, download the PDF and finally upload it to the University of New Hampshire Chemical Environmental Management System (UNHCEMS) database.

Because this task is so simple, an equally-simple idea was proposed: Why can't a bot automate this process?

# What?

The Safety Data Sheet (SDS) Auto-Downloader and Updater tool is a simple solution to a simple problem. It is a cross-platform computer application that allows CEMS database administrators to quickly and easily keep their SDSs up-to-date and available for all students, professors and researchers to peruse.

# Who?

Database administrators of any of the various CEMS websites can use this tool to help keep their site up-to-date. Other users who attempt to access the tool will get nowhere, as it will deny access to the information needed to find the SDSs and render the application useless.

The auto-downloader was developed at the University of New Hampshire's Research Computing Center by Dexter Richards with help and guidance from Philip Collins.