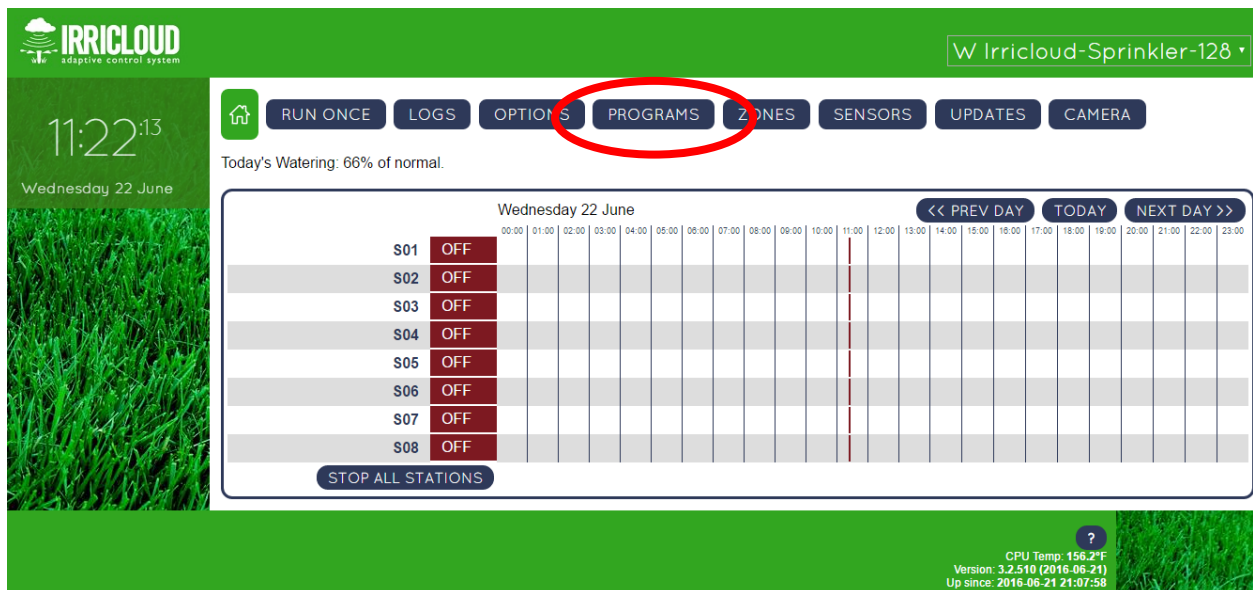


# Program Configuration

The Irricloud system has support for many different styles of watering programs to support both commercial and residential needs. In general, residential systems water only one zone at a time and the Irricloud system supports that. Commercial and agricultural systems frequently water many zones concurrently and that too is supported. Furthermore, sometimes there are times when there are watering restrictions or bans and that too can be described in a program. In fact all of these capabilities can work together which creates some complexity but most people will use just one or two of these capabilities and the programming is straightforward.

Programs are created viewed, and modified by clicking on the “Programs” button located on the Home Page once you have logged onto the system. The Home Page also shows you a history and preview of when your programs will run. This aids in ensuring that what you are programming is what you want. We will see this preview update as we create some programs in the description below.



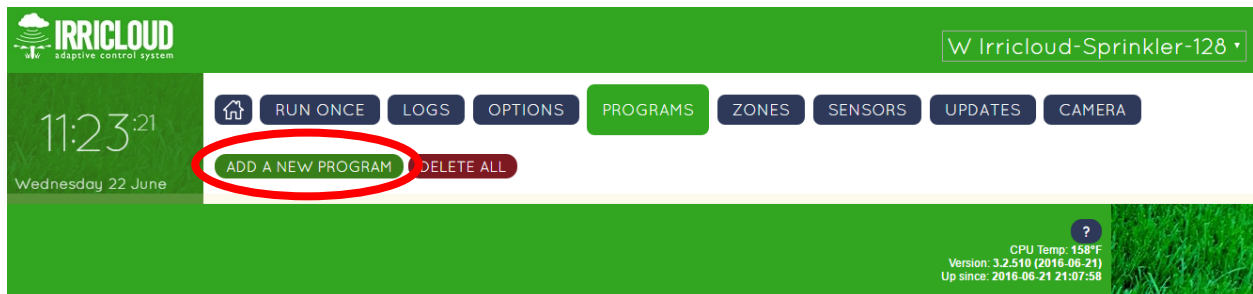
After clicking on the “Programs” button you will see all of your existing programs. Over 75 programs can be created so you shouldn’t worry about running out. Program descriptions will persist across reboots and power outages because they are saved in non-volatile memory; no battery backup is required to keep your programs. However, any existing watering schedules that have already started but not yet completed are lost across a power outage or reboot.

## Creating a Program

The following steps will describe how to create a new program. Modifying an existing program is similar to creating a new program, except the information from the existing program is already populated into the editing window.

Each program must have a unique “Program Name” assigned to it. The program also describes a set of days on which it operates as well as the time(s) during the selected days that it will be active and the zones that are actually affected by the program. We will describe setting up each of these below.

We create a new program by clicking the “Add A New Program” button.



A program editing window will show up where the various aspects of the program can be filled in.

The screenshot shows the 'Add a New Program' window. At the top, there's a green header with the Irricloud logo and the text 'adaptive control system'. On the right, a dropdown menu shows 'W Irricloud-Sprinkler-128'. Below the header, there's a navigation bar with buttons: RUN ONCE, LOGS, OPTIONS, PROGRAMS, ZONES, SENSORS, UPDATES, and CAMERA. The 'PROGRAMS' button is highlighted. Below the navigation bar, there's a section with a clock showing '11:27:13' and the date 'Wednesday 22 June'. To the right of the clock, there's a button labeled 'ADD A NEW PROGRAM' which is circled in red, and a button labeled 'DELETE ALL'. In the bottom right corner, there's a status box showing 'CPU Temp: 158°F', 'Version: 3.2.510 (2016-06-21)', and 'Up since: 2016-06-21 21:07:58'. The main content area is titled 'Add a New Program'. It has a toggle switch for 'PROGRAM ON' (which is turned on) and 'PROGRAM OFF'. Below this, there's a form with the following fields: 'Program Name' (Magic Beans), 'On-Demand Only?' (checkbox), 'Start Time' (06:00), 'Duration' (15:00), 'SINGLE PASS' (checkbox), 'RECURRING' (checkbox), 'Every' (04:00), and 'For' (3) Instances. Below the form, there's a section for 'WEEKLY' and 'INTERVAL' scheduling. The 'WEEKLY' section has a table with columns for days of the week and rows for zones S01, S02, S03, and S04. The 'INTERVAL' section has a table with columns for days of the week and rows for zones S01, S02, S03, and S04. The 'WEEKLY' section has buttons for 'SELECT ALL' and 'CLEAR ALL'. The 'INTERVAL' section has buttons for 'SELECT ALL' and 'CLEAR ALL'. The 'WEEKLY' section has a table with columns for days of the week and rows for zones S01, S02, S03, and S04. The 'INTERVAL' section has a table with columns for days of the week and rows for zones S01, S02, S03, and S04.

The “Program On”/”Program Off” button enables/disables your program. If a program is disabled, it is effectively ignored for watering, but the underlying data is maintained in case you wish to re-enable it in the future; you will not find disabled programs in your watering preview on the Home Page. A program that is enabled is colored green while one that is disabled is rust colored like the S02 “Off” button shown above.

## Watering During a Day

The program describes when during the day watering should occur and what kind of watering takes place.

Each program has a “Start Time” (We are using a 24hour clock in our examples.) and a “Duration” that describe when, within a selected day, the program will operate. The “Start Time” describes when the

program becomes active and is represented in hours and minutes. The “Duration” describes how long the watering will take place and it is represented in minutes and seconds.

Each program can run once during the selected days or can be repeated at a set interval. Repeating a program allows you to create Cycle and Soak intervals where the watering of one “Duration” (cycle) has (“Every”) time minus “Duration” to absorb (soak) into the ground before the next “Duration” (cycle) starts. The example above will water for 15 minutes every 4 hours resulting in three instances of 15 minute watering cycles (45 minutes total) will occur over an 8 hour and 15 minute interval.

If there is no need to repeat a watering cycle for a program, click on the “Single Pass”/“Recurring” button and the “Every” and “For .... Instances” boxes will disappear/reappear.

The menu located to the right of “Program Name” describes what kind of watering should take place when the program is active. The default value is “Sequential Watering” which is appropriate for most residential setups. “Sequential Watering” means that each zone that is selected for this program will water in sequence and each will receive the “Duration” amount of water. Furthermore, if zones associated with other “Sequential Watering” programs are still running when this program is supposed to have another cycle, then these zones are delayed until those other zones have completed. In other words, all zones associated with “Sequential Watering” schedules will run in sequence and not overlap.

In the example above, zones S01 and S03 are selected for this “Sequential Watering” program. After clicking on the “Save” button to save the program you can see on the Home Page that S01 will water at the “Start Time” and repeat 3 times. S03 will start watering when S01 has completed.



Hovering over the program boxes on the Home Page will show you the start time and duration for that snippet.

“Fixed Watering” ensures that the selected zones will start at the “Start Time” and all zones associated with the program will water concurrently. Changing our example program from “Sequential Watering”

to “Fixed Watering” and then looking at the preview shows that zones S01 and S03 are running together at each of 6AM, 10AM, and 2PM.



There are two menu options associated with stopping programmed zones from operating: “Fixed Ban with Stop” and “Fixed Ban with Delay”. Unlike the other program options that enable watering, these options prevent watering. Their schedule is always fixed meaning they will always start at their “Start Time” and run for their “Duration”. They affect only the zones that are selected with the program. Both ban designations will take any existing (selected) zone that is watering or whose cycle start time has passed, but might be waiting due to the sequential nature of “Sequential Watering” and stop that zone from watering until the ban “Duration” has passed. For the “Fixed Ban with Stop” designation, any zone that was stopped will not be restarted after the ban until another program or cycle tells that zone to water. With the “Fixed Ban with Delay”, any remaining time that was cut short will start once the ban is completed. Zones that were delayed and part of a “Sequential Watering” program will still run sequentially after the delay. Zones that were delayed that were part of a “Fixed Watering” program will operate concurrently after the delay. “Sequential Watering” zones that restart after a ban delay may not start immediately after the ban is completed due to interactions with other “Sequential Watering” constraints. Finally, if a zone is delayed to start into the next day, that restart is ignored.

The “Indefinite Watering” menu choice is typically used with On-Demand programs (see below). An “Indefinite Watering” program will continue watering until it is told to stop.

## Watering Day Selection

In addition to specifying what kind of watering is desired, when during the day the watering occurs, and what zones are selected by the program, it is also necessary to specify on what days the program is active.

Most people will use “Weekly” scheduling where the program runs on selected days during the week. Days can be disabled (and re-enabled) by clicking the day name as shown below.

WEEKLY ☒ INTERVAL

SELECT ALL CLEAR ALL

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
S01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S02							
S03	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S04							
S05							
S06							
S07							
S08							

ANY DAY ☒ RESTRICT DAY

SAVE CANCEL

If only “Even Days” or “Odd Days” are desired, the “Any Day”/“Restrict Day” button can be toggled. Note that the 31<sup>st</sup> and February 29<sup>th</sup> are not treated as odd days (or even days!). The program below will water zones S01 and S03 on odd days that do not fall on a Friday.

WEEKLY ☒ INTERVAL

SELECT ALL CLEAR ALL

	MONDAY	TUESDAY	WEDNESDAY	THURSDAY	FRIDAY	SATURDAY	SUNDAY
S01	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S02							
S03	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>		<input checked="" type="checkbox"/>	<input checked="" type="checkbox"/>
S04							
S05							
S06							
S07							
S08							

ANY DAY ☒ RESTRICT DAY

EVEN ☐ ODD (EXCEPT 31ST AND FEB 29TH)

SAVE CANCEL

Some watering schedules do not fit nicely into a weekly paradigm. For example, some drought tolerant plants may only want to be watered once every two weeks. To support that, instead of having a “Weekly” watering schedule, we have an “Interval” watering schedule. Once the “Weekly”/“Interval” button is toggled to select “Interval” watering, one can select the number of days between program watering (14 in the example below), and the number of days from now when that interval should start (4 in the example below). If today is Friday, then the interval below describes a program that waters once every two weeks starting this coming Tuesday.

Note that for any program changes to be made permanent, the “Save” button must be clicked after making the changes.

WEEKLY

INTERVAL

S01

ON

OFF

S02

ON

OFF

S03

ON

OFF

S04

ON

OFF

S05

ON

OFF

S06

ON

OFF

S07

ON

OFF

S08

ON

OFF

WATER INTERVAL:

2

3

4

5

6

7

8

9

10

11

12

13

14

15

16

17

18

19

20

21

22

23

24

25

26

27

28

29

30

STARTING IN:

0

1

2

3

4

5

6

7

8

9

10

11

12

13

SAVE

CANCEL

## On-Demand Programs

Programs can be run based on the schedule described above or they can also be triggered by events like a sensor hitting a “low temperature” threshold or moisture sensor hitting a “high moisture content” threshold. Programs that are triggered by events are referred to as “On-Demand” programs. It is possible for a program to be both an On-Demand program as well as a regularly scheduled program.

If a program is ONLY used for events, then the “On-Demand Only?” checkbox must be checked and there will be no “Start Time” available to fill in. An On-Demand program can still run for a fixed duration and call also run for a repeated number of cycle and soak operations as described above.

A typical use case might be to have a soil moisture sensor that triggers an “On-Demand” program to water zones 2 and 3 indefinitely when soil moisture drops below 23%. Then there is another “On-Demand” program which is a “Ban with Stop” program for zones 2 and 3 that is triggered when the soil moisture content gets above 27%. The sensor readings combined with programs effectively turn on and off watering based on the ground water content.