

# UFS SRW App v3.0.0 Container A Hands-on Tutorial

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# Introduction: UFS

<https://ufs.epic.noaa.gov/>

The Unified Forecast System (UFS) is a community-based, coupled, comprehensive Earth Modeling System

NOAA's operational forecast models for numerical weather prediction (NWP) is quickly transitioning to the UFS

The UFS enables research and development within the broader numerical modeling community (public, private and academic sectors)

Community contributions are highly encouraged!



# Introduction: EPIC

Earth Prediction Innovation Center (EPIC) brings together the broader numerical modeling community in an effort to produce the most accurate and reliable operational modeling system

EPIC supports and accelerates improvements to UFS through open collaboration, code sharing, trainings, and user support

EPIC website aka EPIC Community Portal (ECP): <https://ufs.epic.noaa.gov/>

# Short-Range Weather Application (SRW App)

UFS configurations that support particular forecast requirements (temporal and spatial scales) are called UFS applications

UFS Short-Range Weather Application (SRW App), targets predictions of atmospheric behavior on regional spatial domain and on time scales from minutes to several days SRW App includes a prognostic atmospheric model, pre- & post-processing units, and a community workflow for running the system end-to-end

# SRW App Components

**UFS pre-processing Utilities (UFS\_UTILS):** creates a regional grid and the following files on that grid

- regional grid (regional\_esg\_grid)

- orography (orog)

- surface climatology (sfc\_climo\_gen)

**UFS Weather Model (UFS WM):** A Finite-Volume Cubed-Sphere (FV3) dynamical core (dycore) configured with a Limited Area Model (LAM).

# SRW App Components (contd.)

**Unified Post Processor (UPP):** Processes raw output from a variety of NWP models

**The Model Evaluation Tools plus (METplus)** is a set of statistical verification tools to assess and evaluate the performance of NWPs

**Unified Workflow Tools (uwtools):** A modern, open-source Python package that automates common tasks needed for many standard NWP workflows

# SRW App v3 Container “out-of-the-box” test case

Building and running the SRW App vary from system to system. Installation via container reduces this variability and allows for a smoother build experience

Build and run an “out-of-the-box” weather forecast for June 15-16, 2019, using the SRW App v3 container on the Singularity/Apptainer runtime

- Predefined 25-km Continental US (CONUS) grid (RRFS\_CONUS\_25km)
- Global Forecast System (GFS) version 16 physics suite (FV3\_GFS\_v16 CCpp),
- FV3-based GFS raw external model data for initialization

# SRW App v3 Pre-built Container Image

For Users who have access to the following NOAA supported machines

The SRW App v3.0.0 can now run on all platforms using the pre-built container image that includes all the required software

The pre-built container image: **ubuntu22.04-intel-srw-release-public-v3.0.0.img**

Locations of pre-built containers	
Machine	File Location
Derecho	/glade/work/epicufsrt/contrib/containers/
Gaea-C5	/gpfs/f5/epic/world-shared/containers/
Gaea-C6	/gpfs/f6/bil-fire8/world-shared/containers/
Jet	/mnt/lfs5/HFIP/hfv3gfs/role.epic/containers/
NOAA Cloud	/contrib/EPIC/containers/
Orion/Hercules	/work/noaa/epic/role-epic/contrib/containers/

# SRW App v3 Pre-built Container Image and Out-of-the-box Input Data

**For External Users ONLY!!!!**

The Container Image and the input data needed to run this experiment is available to download from NOAA's AWS S3 data bucket

<https://noaa-ufs-srw-pds.s3.amazonaws.com/index.html#experiment-user-cases/release-public-v3.0.0/>

- **ubuntu22.04-intel-srw-release-public-v3.0.0.img**
- out-of-the-box/fix\_data.tgz
- out-of-the-box/gst\_data.tgz

# Prerequisites for External Users

**Intel Compiler and MPI:** Users must have an Intel compiler and MPI  
<https://www.intel.com/content/www/us/en/developer/tools/oneapi/hpc-toolkit-download.html>

**Rocoto workflow manager:** To take advantage of automated workflow options, users must have this workflow manager installed on their system.  
<https://github.com/christopherwharrop/rocoto>

**Singularity/Apptainer:** Users need to have a container runtime-including all the required dependencies-installed following the steps outlined in the Apptainer Installation Guide <https://apptainer.org/docs/admin/1.2/installation.html>



# SRW APP v3 GitHub Pages

SRW APP v3 get Code Page

- <https://www.epic.noaa.gov/get-code/short-range-weather/>

SRW App Get Issues Page

- <https://github.com/ufs-community/ufs-srweather-app/issues>

SRW App Report Bug/ Issues Page

- <https://github.com/ufs-community/ufs-srweather-app/discussions/categories/q-a>

SRW App Get Issues Page

- <https://github.com/ufs-community/ufs-srweather-app/wiki>

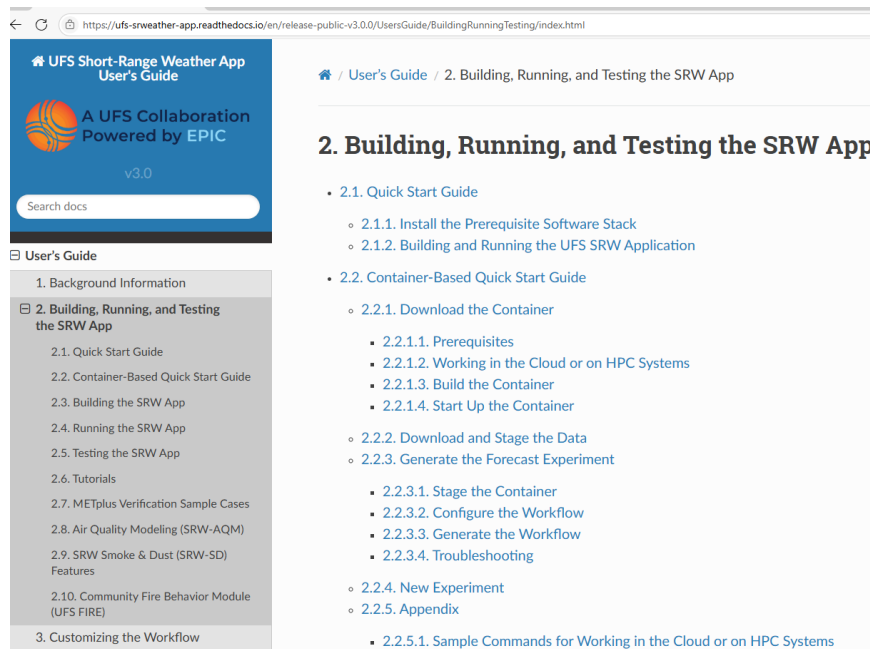
# SRW App v3 User's Guide & Technical Documentation

<https://ufs-srweather-app.readthedocs.io/en/develop/>

<https://ufs-srweather-app.readthedocs.io/en/develop/TechDocs/index.html>

# SRW App v3 Container based quick start guide

- <https://ufs-srweather-app.readthedocs.io/en/develop/UsersGuide/BuildingRunningTesting/ContainerQuickstart.html>



The screenshot shows a web browser displaying the SRW App v3 User's Guide. The page title is "UFS Short-Range Weather App User's Guide" and it is a UFS Collaboration powered by EPIC. The version is v3.0. The page is titled "2. Building, Running, and Testing the SRW App". The navigation menu on the left includes:

- 1. Background Information
- 2. Building, Running, and Testing the SRW App
  - 2.1. Quick Start Guide
  - 2.2. Container-Based Quick Start Guide
  - 2.3. Building the SRW App
  - 2.4. Running the SRW App
  - 2.5. Testing the SRW App
  - 2.6. Tutorials
  - 2.7. METplus Verification Sample Cases
  - 2.8. Air Quality Modeling (SRW-AQM)
  - 2.9. SRW Smoke & Dust (SRW-SD) Features
  - 2.10. Community Fire Behavior Module (UFS FIRE)
- 3. Customizing the Workflow

The main content area shows the following sections:

- 2. Building, Running, and Testing the SRW App
  - 2.1. Quick Start Guide
    - 2.1.1. Install the Prerequisite Software Stack
    - 2.1.2. Building and Running the UFS SRW Application
  - 2.2. Container-Based Quick Start Guide
    - 2.2.1. Download the Container
      - 2.2.1.1. Prerequisites
      - 2.2.1.2. Working in the Cloud or on HPC Systems
      - 2.2.1.3. Build the Container
      - 2.2.1.4. Start Up the Container
    - 2.2.2. Download and Stage the Data
    - 2.2.3. Generate the Forecast Experiment
      - 2.2.3.1. Stage the Container
      - 2.2.3.2. Configure the Workflow
      - 2.2.3.3. Generate the Workflow
      - 2.2.3.4. Troubleshooting
    - 2.2.4. New Experiment
    - 2.2.5. Appendix
      - 2.2.5.1. Sample Commands for Working in the Cloud or on HPC Systems

Email us! [support.epic@noaa.gov](mailto:support.epic@noaa.gov)

