# Migrating Existing REDCap Instance to New Server

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This presentation is a summary of the detailed instructions at https://github.com/OuhscBbmc/redcap-migration/blob/main/sources/redcap-installation-public-oklahoma.md.

## Description for Agenda

A live migration might be completed in 12 hours, but it requires months of resource allocation, planning, and practicing. We discuss strategies for minimizing risk and downtime as you move an established REDCap instance to new hardware.

## Background

- This summarizes a REDCap upgrade from an old Windows instance to a new RHEL instance.
  - Our instance was stuck on an old version of REDCap (say, v11) because the WAMP stack was also old and didn't support the newest requirements and didn't easily upgrade.
  - We started with the newest stack possible (eg, RHEL, PHP, & MariaDB versions) but initially installed only v11 of REDCap (the exact same as the as the old instance).
  - After a day or two of stability with live users on v11 on the new instance, we upgraded to the newest REDCap (say v12).
- Our scenario might be coming be more commonplace in the next few years at institutions with light IT support. (At OU, a research group is responsible for REDCap, and IT helps with the stack underneath.)
- !! Please consider the security & authentication involved and the vulnerable transitions between

  (a) your existing server,
  (b) the stub database on the new instance, and
  (c) the migrated database on the new instance.

- All institutions have different environments. Please review your migration plan with your campus's security team beforehand. For instance, it would be very bad to migrate a database full of PHI that's connected to a web server that hadn't been secured first.
- We'll cover migrating from a local server to another local server. See Greg & MGB's later presentation on unique challenges of migrating to Azure. It will cover unique challenges of Azure migration, after a larger discussion of hosting REDCap in Azure.
- Suggestions are welcome. Consider if there are better ways to accomplish these goals, or clearer ways to communicate the ideas.

## Today's definition of migration

When we say "migration", we mean transitioning from one (db+web) server to another.

- Data files are moved (ie, database & edocs)
- Decide about the supporting files:
- Option 1 -Everything else is brand new, including:
  - database server & maybe even the database engine
  - REDCap's PHP files
  - config files (eg, php.ini & apache.config)
  - authentication system possibly
    - which means usernames in database might change in ~8 tables
    - See Greg's Azure migration presentation
  - url of the server, possibly
- Option 2 -Copy existing REDCap's PHP & config files
  - Possible only if components are the same:
    - OS
    - database engine
    - web server
    - authentication system
  - Yet minor, but important, modifications might arise, such as:
    - error log location
    - PHP directory

## Bring a friend

- To spread the misery around
- More eyes & different skills
- Being socially isolated leads to unhappiness & mistakes
- Leverage everyone's different perspective & experience
- The interpersonal conversations can lead to solutions that no one was aware of initially.

## First establish stack underneath REDCap

- Create VMs for database & web server (and optional token server)
- Install Apache (on the web server)
- Install PHP (on the web server)
- Install MariaDB (on the db server)
- Requests to Campus IT for networking
- Establish edocs storage & connections
- Strategy for transferring files
- Install GNOME (optional for Linux)
- Install DBeaver (assuming on some RHEL VM)

## Requests to Campus IT for networking

This can be a headache to get all the point-to-point connections correct the first time.

- firewall exception for `prod-2-web` to `prod-2-db`
- firewall exception for `prod-2-web` to REDCap's Community site (to download upgrades)
- firewall exception for `prod-2-web` to the edocs location.
- firewall exception for `token-guide-1` to `prod-2-db` (optional – for token server below)
- load balancer – but wait until both servers are secured for PHI!

## Strategy for transferring PHP & config files

- You may need to move some new files to both RHEL servers, such as the

  (a) REDCap installation files to the web server,
  (b) SQL scripts to install & upgrade the database, and
  (c) configuration files.

- It is a small security risk to allow the servers to access a bunch of external servers. It's also tedious to submit a ticket for each new firewall exception.

- Ideally, use your local desktop as the middleman. Download the files to your desktop first, and then transfer them to the server with a protocol like scp. If the local machine is Windows, programs like Robocopy and WinSCP make this an easy drag & drop.
- If you're using Windows & RDP (or Linux & ssh windows), you can just copy & paste across machines.

### Strategy for transferring PHI files

- Specifically, edocs & database.
- Similar to transferring config files, but use an institutional file share (or AWS S3 bucket or Azure container)
- The security implications:
  - Make sure every waypoint is secure as the files jump between machines.
  - Remember to remove PHI files from all intermediary stops.

### Separate "Upgrade" step and "Migrate" step

- Reason: don't change two things at once to help isolate & address subtle problems.
- Don't upgrade & migrate in the same step (eg, from v13.1.0 on local to v14.1.0 in the cloud)
- Ideally upgrade your old instance before migrating
- If you migrate before you upgrade, consider staying on the old version for a few weeks before you upgrade. It helps identify location of problems.
- Remember that REDCap's database is updated with DDL commands on tables populated with live data. (*D*ata *D*efinition *L*anguage is the subset of SQL that creates & modifies the structure of the database, not the data itself.)

### Practice Migration & Backup Frequently

- Practice:
  - We strongly encourage you to practice the migration 4+ times.
  - Don't start a live migration until you complete 1+ smooth practice run.
- Backups:
  - We preferred VM snapshots over database backups.
  - Regardless of the method, backup frequently.

## Install GNOME (optional for Linux)

- Institutions staffed with Linux experts might prefer to use only the command line. They might not need/want a desktop environment

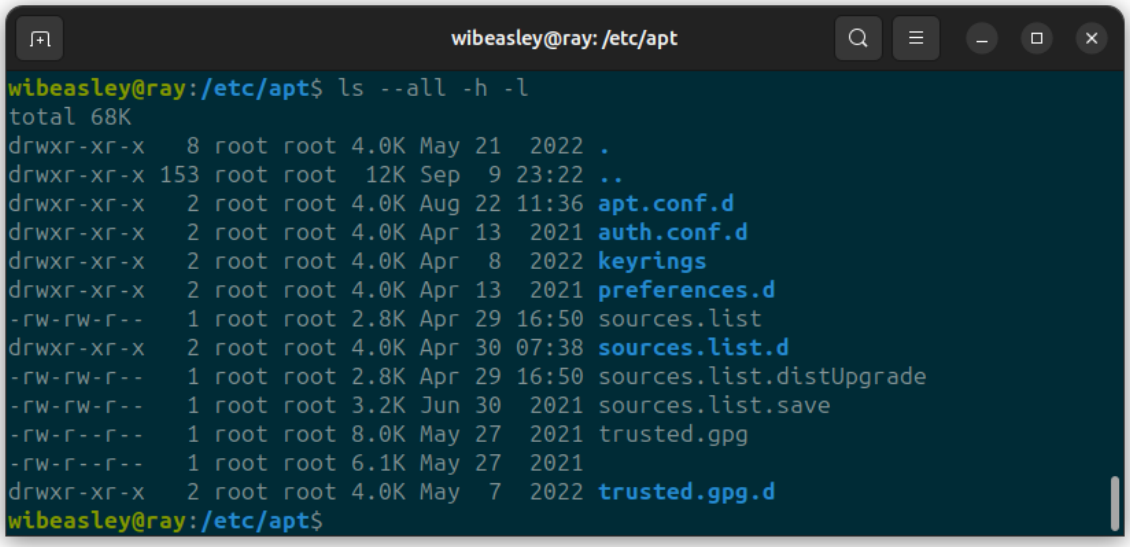


Figure 1: files in bash

- However other less experienced admins (like us) benefited from using a mouse for some tasks. So we installed the GNOME desktop environment. Consider this if the REDCap admins are coming from Windows.

Cons of desktop environment:

- Installing a desktop environment increases the vulnerability surface and therefore theoretically increases risk. (Like installing almost any additional software.) But that risk is probably minimal.

Pros of desktop environment:

- People who are uncomfortable with command line administration will be more productive initially because the visual metaphors will be familiar to them.
- A desktop environment might *decrease* the practical risk among new Linux admins, because they'll be less likely to make mistakes (eg, moving a sensitive file into the wrong directory).

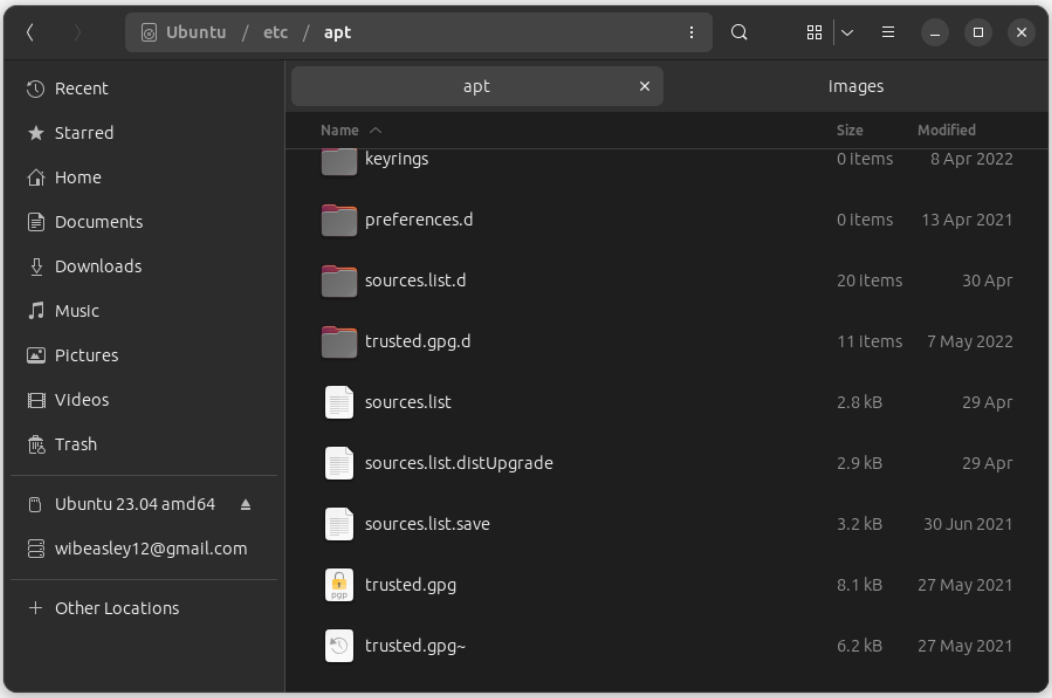


Figure 2: files in GNOME

## Realistic Timelines

Working backwards:

- Go live migration when REDCap is offline: 4-12 hours
- Developing the specific steps & practicing four times: 4 weeks
- Prep: 6-18 months
  - Buy in from leaders and IT department
  - Budget allocation & financing
  - Getting the right humans involved
  - Acquiring hardware or SLA
  - Reading & meeting regulations & IT policies
  - Infrastructure, such as network firewalls & user authentication
  - Configuring machines & network
  - Feedback from your questions on REDCap's Community forum.
- Choose a window to migrate. It's a balance between
  - affecting the users the least (such as 3am on a slow weekend during the summer).
  - having the right IT support in case it goes wrong (such as a fixing network config).
  - A compromise might be 9am

## Themes & Takeaways

- Practice many times on a test/dev instance
- Document every single command.
  - It's tedious, but very helpful when you're running through it a few times and forget if you did something for the current practice run, or the previous practice run.
  - It's much quicker in the long run.
- Our Linux scripts are a starting point, but you'll need to fork your own document
- Every institution's setup is different, including:
  - network topology
  - authentication
  - REDCap version
  - hardware
  - OS
    - Linux may be easier than Windows if you're more comfortable with bash than PowerShell. Or vice versa.
    - If you're installing on Windows with the GUI (not with PowerShell), take screenshots of your steps when you practice. If there's a tricky/subtle option, overlay the screenshot with a big red circle/arrow.