# Towards distributed image reconstruction

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Radio interferometers do not observe the sky as an image with pixels. Instead, they observe it in the Fourier domain, and measure an incomplete set of Fourier components. An image reconstruction algorithm has to calculate the most likely image from the measurements. Because such algorithms are as old as radio interferometers themselves, they were developed before the advent of GPU acceleration and distributed computing. An image reconstruction usually consists of three steps: the gridding step, that maps Fourier components on a regularly spaced grid, the inverse FFT that calculates the dirty image, and the deconvolution step, that computes the actual reconstructed image. The Image Domain Gridder (IDG) already uses GPU acceleration and easily extends to a distributed algorithm. The deconvolution step however is still dominated by CLEAN variants, which are difficult to adapt to a distributed environment. We formulate the deconvolution as a new compressed sensing approach, and apply distributed coordinate descent methods together with a distributed IDG. We test the distributed reconstruction on a real-world MeerKAT observation and explore the difficulties and opportunities of a distributed environment.