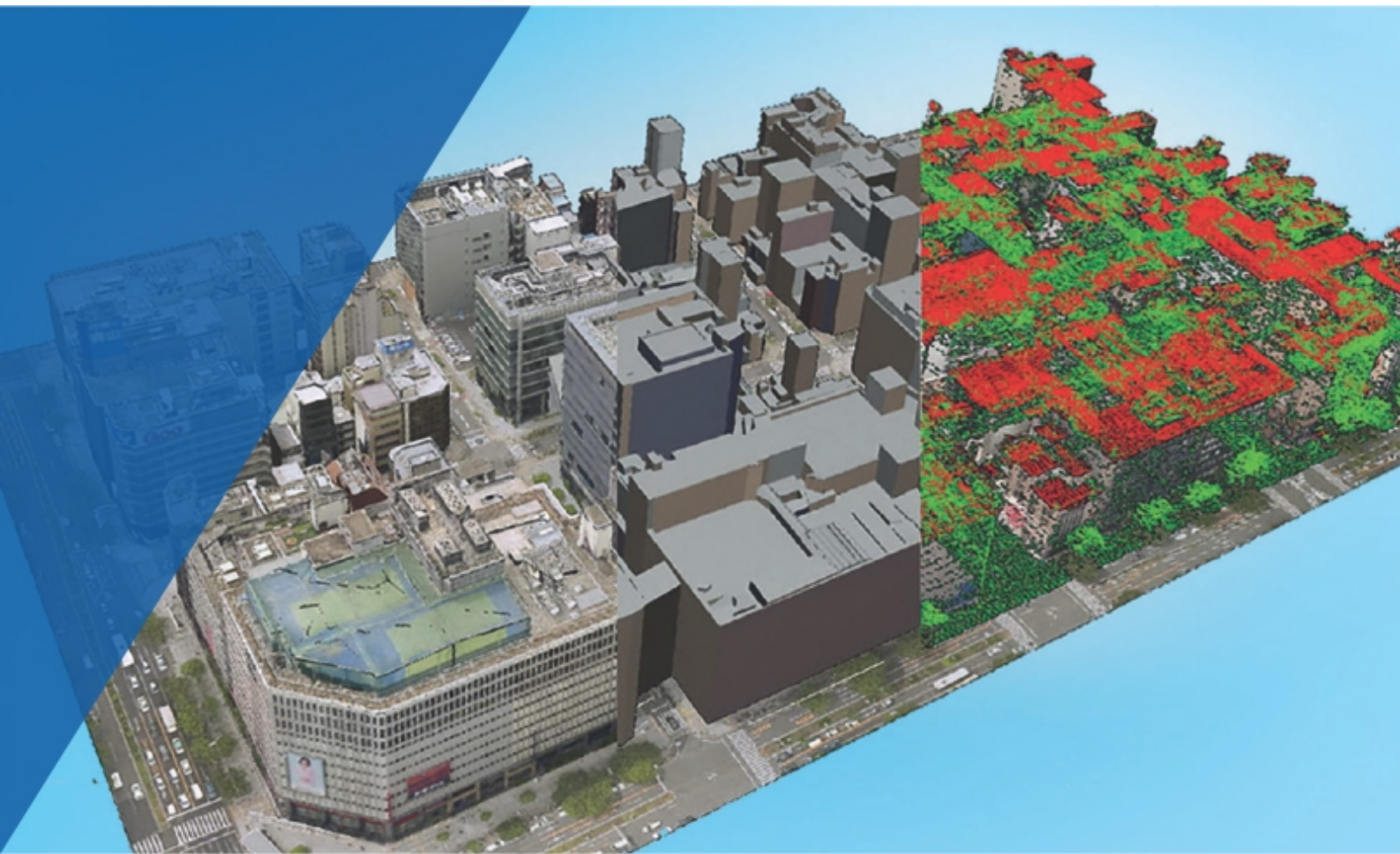


# TerraBatch USER GUIDE

64-bit version



© 2024 Terrasolid Ltd, Arttu Soininen. All rights reserved.

Document created in January, 2024

# Contents

## Copyright

## Getting Started

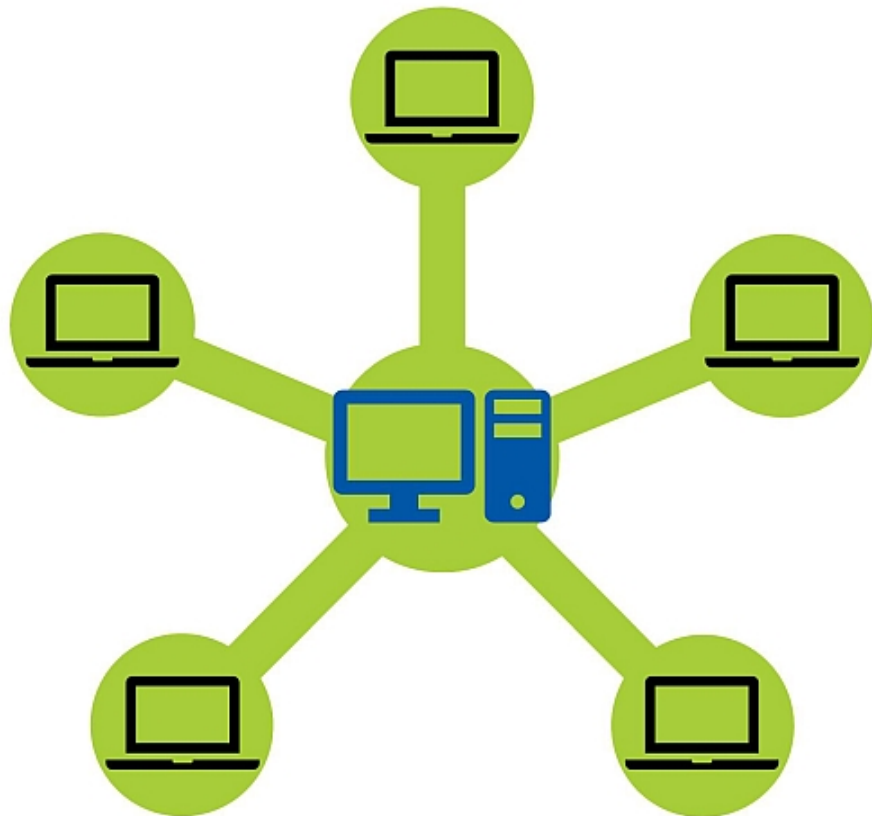
- 5 About this User Guide
- 6 TerraBatch
  - 7 Technical requirements
  - 8 Installation
  - 10 Licensing
  - 10 Background processing workflow
  - 11 Setup scenarios

## Working with TerraBatch

- 13 TerraDispatcher
  - 16 Number of Instances
- 18 TerraBatch Preferences File
- 19 Installation Directories

# TERRABATCH USER GUIDE

64-bit TerraBatch



© 2000-2024 Arttu Soininen, Terrasolid. All rights reserved.

Version 13.09.2022



## © 2024 Terrasolid Ltd

All rights reserved. No parts of this work may be reproduced in any form or by any means - graphic, electronic, or mechanical, including photocopying, recording, taping, or information storage and retrieval systems - without the written permission of the publisher.

Products that are referred to in this document may be either trademarks and/or registered trademarks of the respective owners. The publisher and the author make no claim to these trademarks.

While every precaution has been taken in the preparation of this document, the publisher and the author assume no responsibility for errors or omissions, or for damages resulting from the use of information contained in this document or from the use of programs and source code that may accompany it. In no event shall the publisher and the author be liable for any loss of profit or any other commercial damage caused or alleged to have been caused directly or indirectly by this document.

Printed: January 2024 in Finland.

## Trademarks

TerraBore, TerraGas, TerraHeat, TerraLink, TerraMatch, TerraModeler, TerraOpen, TerraPark, TerraPhoto, TerraPipe, TerraScan, TerraBatch, TerraStereo, TerraStreet, and TerraSurvey are trademarks of Terrasolid Limited.

Spatix is a trademark of GISware Integro.

MicroStation®, MDL® and MicroStation stylized "M" are registered trademarks of Bentley Systems, Incorporated. Bentley Map PowerView and MicroStation CONNECT are trademarks of Bentley Systems, Incorporated.

Windows is a trademark of Microsoft Corporation.

Acrobat Reader is a trademark of Adobe Systems Incorporated.

OSTN02 and OSTN15 are trademarks of Ordnance Survey, the national mapping agency of Great Britain.

Intergraph Raster File Formats - Copyright - 1994 Intergraph Corporation. Used with permission.

## About this User Guide

This document serves as a user's guide for TerraBatch. TerraBatch is a Windows application.

The PDF version of the user guide is created in order to provide an offline version of the online webhelp. It shall be updated together with the webhelp. Some parts of the webhelp may be left out on purpose in the PDF document. In case of inconsistency, the online webhelp is the primary source of information. The user is responsible for keeping his/her offline version updated.

## Document conventions

The following conventions and symbols appear in this guide:

- OR - alternate procedures or steps in a procedure.
- C:\TERRA - paths to directories of files on a hard disk are written with capital letters.
- ***To do*** - the beginning of a workflow is introduced with bold-italic letters.

Notes and hints are highlighted in light blue boxes.

# TerraBatch

## Introduction

TerraBatch is a Windows application for batch processing TerraScan, TerraPhoto and TerraMatch tasks. Thus, it's an alternative method for running processes that TerraScan, TerraPhoto and TerraMatch can run as well.

The advantages of using TerraBatch are:

- run batch processes without tying up CAD software
- run multiple instances on one computer to speed up a task
- distribute processing to multiple computers to speed up a task

## Terminology

**Master computer** is a computer where a human user initiates a task with TerraScan, TerraPhoto or TerraMatch.

**Batch computer** is a computer processing tasks initiated from some other computer. Batch computer can be a computer without a human operator. A master computer can act as a batch computer for tasks initiated from other computers.

**Working segment** is a set of data to be processed. Working segment can be, for example:

- one TerraScan project block
- one TerraPhoto image

**Distributed processing** is computation that involves multiple computers. One computer acts as master computer and other computers act as batch computers.

**Single computer processing** is computation that takes place on one computer only. TerraBatch can run multiple program instances concurrently on the same computer.

## Software components

**TerraScan / TerraPhoto / TerraMatch** launches a task to be processed by TerraBatch. This may be, for example:

- a macro running on each project block.
- compute feature points for every image.

**TerraDispatcher** runs on a master computer and dispatches working segments to participating computers. This means

- for the master computer: TerraDispatcher starts TerraBatch with a segment assigned.
- for Batch computers: TerraDispatcher writes segment assignment as a file for the TerraBatchService.

[TerraDispatcher](#) has a graphical user interface where the user can monitor a task and modify the way of how a task is processed.

**TerraBatchService** is a service running on a batch computer. It checks regularly for segment assignment files that appear in \TERRA64\QUEUE on the master computer. If an assignment file is found, it launches TerraBatch. TerraBatchService has no user interface.

**TerraBatch** is an application which processes one working segment at a time. TerraBatch has no user interface.

The old TerraBatch application (tslave.exe) is not replaced by the new TerraBatch application (TerraSlave.exe). This means, the old application is still available, for example, for user-developed software that access TerraBatch.

## Hardware and software requirements

To run TerraBatch, you must have the following:

- quad-core processor or better, TerraBatch benefits from high core count processors
  - multi-threaded task: one instance of TerraBatch can use many cores
  - single-threaded task: one instance of TerraBatch uses one core
- 8 GB RAM minimum, 32 GB RAM or more recommended
  - 32 GB RAM is enough for running 1-2 instances of TerraBatch with about 100 million point block size
  - add 8 - 16 GB RAM for each additional instance when using about 100 million point block size
- SSD hard disc or other storage device with fast local access speed is recommended
- fast connection to data for distributed processing required
- Windows x64 version 7 or later

## Access permissions for distributed processing

For distributed processing, there are specific permissions required for accessing folders and files. This enables TerraBatch to read all required information for processing a task, for example user settings, coordinate system information, trajectory information, and so on.

The master computer, that launches a task, must have:

- the \TERRA64 folder shared for read access.
- the data folder(s) shared for read/write access. This may involve folders that store the source data, the result data, macros and all other data required for the processing task.
- read/write access to the \TERRA64\TBATCH folder of batch computers, that are used for processing a task.

Batch computers, that participate in a task, must have:

- the \TERRA64\TBATCH folder shared for read/write access

- read/write access to \TERRA64\TBATCH folder of the master computer
- read/write access to the data folder(s)

Paths are converted automatically from local paths such as E:\JYVASKYLA\LASER01 to UNC paths such as \\PC-40\JYVASKYLA\LASER01. You should use UNC paths yourself to verify that everything is properly shared.

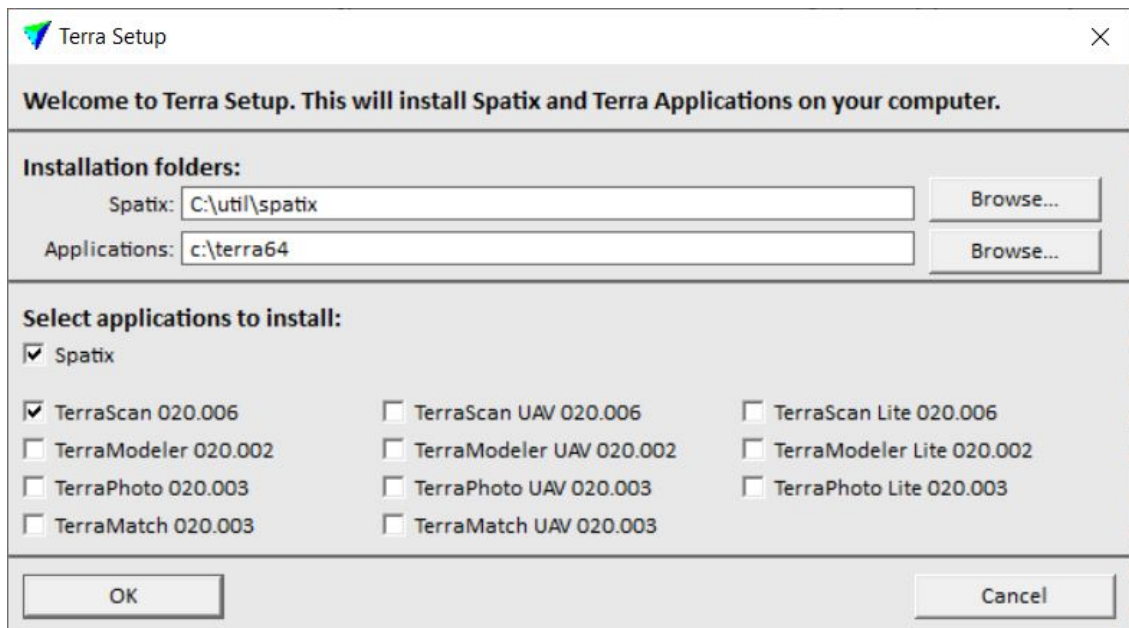
## Installation

The steps for the installation of TerraBatch depend whether it is installed on a master computer or on a batch computer. Basically, on a master computer TerraBatch is installed together with other Terra applications and no separate setup is required. On a Batch computer, TerraBatch is installed as only application with its own setup.

### Master computer setup

Run normal [TerraScan](#)/[TerraPhoto](#)/[TerraMatch](#) setup as described in the corresponding User Guides.

The **Terra Setup** dialog below shows the setup of TerraScan on top of Spatix as example:



This installs TerraDispatcher and TerraBatch as part of the TerraScan setup.

There is no need to separately install TerraBatch unless you want to use the same computer as a batch computer (=run tasks initiated from other computers).

### Batch computer setup

Run TerraBatch setup on all computers which will act as a batch computer for processing tasks.



**To install TerraBatch on a batch computer:**

1. Start **setup.exe** in the installation package with **administrator permissions**.

This opens the **TerraBatch** dialog:

2. Define the installation folder(s) where to install TerraBatch. The same installation folder must be used for all Terra applications.

The default **Folder choice** is **Default c:\terra64**. This installs all executables and setting files into the same folder C:\TERRA64. The folder is created automatically, if it does not exist.

As an alternative, if executables and settings files need to be separated, select another **Folder choice**:

- **Default 'Program files'** - executables are installed into C:\PROGRAM FILES\TERRASOLID, setting files are installed into C:\TERRA64.
- **Freely selectable folders** - the user defines a folder for **Executables** and **Settings** in the corresponding input fields. Click on the **Browse** button next to each input field in order to select a folder.

3. Type a **User name** and **Password** in the text fields. TerraBatchService needs user name and password for an account which has the [appropriate read/write access](#) to shared folders on the master and batch computers.
4. Click OK.

This installs TerraBatch and TerraBatchService on the batch computer. When the installation is finished, a message is displayed.

The single TerraBatch setup contains a PDF with general information about TerraBatch. The PDF is stored in the \TERRA64\DOCS folder of your Terra application installation folder.

## TerraBatch Licensing

A separate TerraBatch license needs to be purchased for computers with no TerraScan/TerraPhoto/TerraMatch license.

No separate TerraBatch license is needed on a computer, where

- TerraScan is installed and licensed. TerraBatch can execute TerraScan tasks with the same license (tscan.lic).
- TerraPhoto is installed and licensed. TerraBatch can execute TerraPhoto tasks with the same license (tphoto.lic).
- TerraMatch is installed and licensed. TerraBatch can execute TerraMatch tasks with the same license (tmatch.lic).

## Background processing workflow

TerraBatch is usually launched when a task is started in TerraScan, TerraPhoto or TerraMatch.

The [TerraDispatcher](#) window opens and shows the progress of the process.

In the background, TerraBatch performs the following actions:

1. The Terrasolid Application that starts the task writes a task file (\*.TSK) into the \TASK folder of the TerraBatch installation directory on the master computer, for example C:\TERRA64\TBATCH\TASK. The task file is a text file consisting of all information that is required for TerraBatch to perform the task. The task file is named automatically according to the point of time when it is created. The name structure is <DATE>\_<TIME>.TSK, for example 20200523\_093349.tsk.

In addition, two more text files related to the task file are created:

- <DATE>\_<TIME>\_computers.txt - list of computers for processing as set in the [Batch computers category](#) of TerraScan **Settings** or in the [TerraBatch Task Settings dialog](#) of the **Macro** window of TerraScan
- <DATE>\_<TIME>\_segments.txt - list of working segments to be processed including the path to the task file.

2. TerraDispatcher checks the participating computers. Working segments are dispatched until the maximum number of instances allowed for TerraBatch processing is reached on each available computer. A report text file for each dispatched working segment is created in the \TBATCH\PROGRESS folder on the master computer.

If batch computers are involved, TerraDispatcher writes a text file for each working segment assigned to a batch computer in the \TBATCH\QUEUE folder. The TerraBatchService on the

batch computer checks regularly the \QUEUE folder on the master computer for waiting files. If it finds a file, TerraBatch is launched on the batch computer and processing starts.

3. While TerraBatch processes a working segment, it continues writing the report in the \TBATCH\PROGRESS folder on the master computer.
4. After TerraBatch completed the processing for a working segment, it moves the report to the \TBATCH\REPORTS folder on the master computer.
5. After TerraBatch completed the task, it moves the task file and all related text files from the \TBATCH\TASK folder to the \TBATCH\REPORTS folder.

The reports are stored in text files and include information about the processing steps performed on the working segments and a status remark. Report files are named in the same way as task files with the addition of a working segment number. The name structure is <DATE>\_<TIME>\_<NUMBER>.TXT, for example 20200523\_093349\_000001.txt. The number is increased automatically for each working segment.

6. If another task has been started while the previous task was still processed, the task file and related text files are written in the \TBATCH\TASK folder. When the previous task is finished, TerraDispatcher starts immediately to dispatch the next task. Waiting tasks are processed according to the creation time of the task file, first created tasks are first in processing order.

TerraDispatcher automatically takes care of the distribution of working segments in automatic dispatching mode. This is the default processing mode when tasks are started in TerraScan/TerraPhoto/TerraMatch. The user can change to manual dispatching mode either in TerraBatch task settings in the Terrasolid Application starting a task or in the [TerraDispatcher](#). Thus, the user takes control on how the working segments are distributed to participating computers.

## Setup scenarios

In this section, three scenarios for using TerraBatch are outlined. They should not be seen as separate setup option. Instead, in a company it is most likely that a combination of these scenarios is used for achieving the best possible processing performance.

### Single computer setup

TerraBatch is installed on a workstation that is also used by a user for interactive work. Other Terra applications, such as TerraScan, TerraPhoto, TerraMatch and TerraModeler are installed on the same computer. The data for processing is stored locally on the workstation.

Advantages of using TerraBatch:

- No additional license is required. TerraBatch uses the licenses of other Terra applications.
- The CAD software is available for interactive work while TerraBatch is working on a processing task.
- TerraDispatcher and TerraBatch work in the background.

- The processing speed for the TerraBatch task can be optimized by using the best-suited number of instances.
- No network connection is effecting the processing speed.

## Server computer setup

TerraBatch is installed on a server machine that has a high number of processor cores and a good amount of RAM. The data for processing is stored on the server machine. The server machine acts as batch computer for TerraBatch processing. A single TerraBatch license is required for the server computer because there are no other Terra applications installed.

Another workstation computer is used for interactive work. Terra applications, such as TerraScan, TerraPhoto, TerraMatch and TerraModeler are installed on the workstation. The workstation acts as master computer for TerraBatch processing. For interactive work, it accesses the data on the server via the network connection.

Advantages of the setup:

- TerraBatch processing is done on a powerful server computer, where many instances can be used.
- TerraBatch has local access to the data, no network connection effects the reading and writing speed.
- The workstation is available for interactive work. No background process effects the performance of the workstation computer.

Make sure that the [technical requirements for distributed processing](#) are fulfilled in this setup.

## Multiple computer setup

Several workstations are connected in a network. They are used for interactive work as well as for TerraBatch processing. Workstations for interactive work may have other Terra applications installed, others may have only TerraBatch installed and licensed. The data for processing is stored on one of the workstation computers or on another server machine. In this setup, the processing speed on all computers is effected by the network connection.

Advantages of the setup:

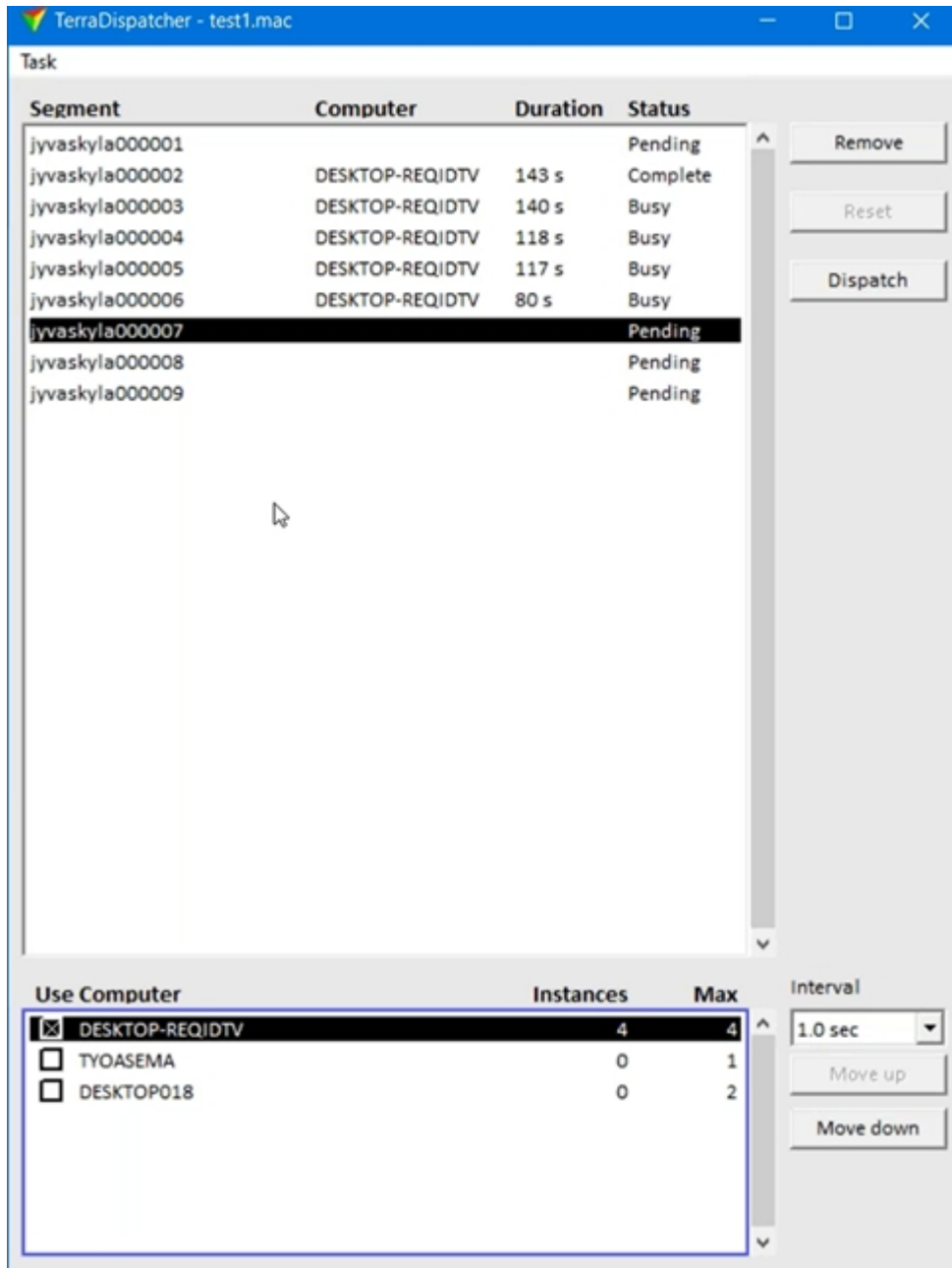
- Many computers are available for interactive work and/or TerraBatch processing in a flexible way.
- Different computers can act as master or batch computer for TerraBatch processing.
- Distributed processing is possible if several computers run TerraScan/TerraPhoto/TerraMatch, additional single TerraBatch licenses are not necessarily required but easy to integrate.
- Computers that are not occupied by a user for interactive work can be used to improve processing speed for time-consuming tasks.

Make sure that the [technical requirements for distributed processing](#) are fulfilled in this setup.

## TerraDispatcher

TerraDispatcher is the software component of TerraBatch that allows the user to manage the processing task. It provides a graphical user interface that contains lists of working segments and participating computers, as well as controls for modifying the way of processing.

The **TerraDispatcher** interface is opened on the master computer as soon as a task is launched.



### List of working segments

The upper list in the window shows all working segments that need to be processed.

- **Segment** is the name of a working segment, such as the name of a TerraScan project block or the name of an image in TerraPhoto.
- **Computer** is the name of the computer that processes the working segment.
- **Duration** shows the processing time in seconds. This is updated automatically every 2 seconds.
- **Status** indicates the processing status of a working segment:
  - *Pending* - waiting to be dispatched and processed.
  - *Busy* - currently processed.
  - *Dispatched* - dispatched to a computer but not yet processed.
  - *Complete* - process completed.

## List of computers

The lower list in the window contains available computers.

- **Use Computer** shows the names of all available computers. By default, all computers that are enabled in the [Batch computers category](#) of TerraScan **Settings** or in the [TerraBatch Task Settings dialog](#) of the **Macro** window of TerraScan are available for processing. Click on the square in front of the computer name in order to switch on/off a computer for processing.
- **Instances** shows the number of occupied instances on a computer.
- **Max** shows the maximum number of instances used for automatic dispatching. Click on the number in order to modify it. If the number is increased, pending working segments are dispatched to the newly-available instances. If the number is decreased, the processing of already busy working segments is continued but automatic dispatching will wait until the number of occupied instances falls below the number of maximum instances. [See recommendations for choosing a good number of instances.](#)

A computer that is not available in the network is shown in red color and switched off from use.

## User controls

By default, TerraBatch starts processing with automatic dispatching active. This means, the task is distributed to all available participating computers and instances. As soon as an instance becomes free, another pending working segment is dispatched to this instance. The user can pause the automatic dispatching if necessary.

MENU COMMAND / BUTTON	EFFECT
Task / Pause automatic dispatching	Pause the automatic dispatching of working segments. This enables other controls of the window for manual dispatching or task manipulation. This is available if automatic dispatching is active.
Task / Resume automatic dispatching	Resume the automatic dispatching of working segments. This disables most of the other controls of the window. This is available if manual dispatching is active.

MENU COMMAND / BUTTON	EFFECT
Abort task	Aborts an active task and thus, stops the processing of all working segments on the master computer. The task file and all related working files for TerraBatch are moved to the \TBATCH\REPORTS folder. A task can not be aborted on batch computers, working segments that are already processed on batch computers will be finished.
Remove	Removes a working segment from the list. The report file of the working segment is moved to the \TBATCH\REPORTS folder, the processing status in the report is set to removed. The removal can not be undone. This is only active if automatic dispatching is paused and a working segment with status <i>Pending</i> or <i>Complete</i> is selected in the list.
Reset	Resets a working segment to status <i>Pending</i> . The instance used for processing the working segment becomes free. The working segment will be processed again. This is only active if automatic dispatching is paused and a working segment with status <i>Busy</i> or <i>Complete</i> is selected in the list.
Dispatch	Dispatches a working segment manually to the computer that is selected in the list of participating computers. A new instance on the computer starts immediately with the processing. This may exceed the maximum number of instances set for the computer. This is only active if automatic dispatching is paused, a working segment with status <i>Pending</i> is selected in the upper list and a computer is selected in the lower list of the window.
Interval	Determines how often the software checks the processing status and dispatches the next block if an instance becomes free. Choose a very short interval if processing of one block takes only a short time for processing.
Move up	Moves the selected computer up in the list of processing priority order. This is only active if another computer than the first one is selected in the list.
Move down	Moves the selected computer down in the list of processing priority order. This is only

MENU COMMAND / BUTTON	EFFECT
	active if another computer than the last one is selected in the list.

If a task is stopped in a way outside the user's control, for example, if TerraBatch crashes, the task file and all related files remain in the \TASK folder in the TerraBatch installation directory. Make sure to delete the task file from the folder manually before you start the next task in TerraBatch. If a task file is in the \TASK folder, TerraBatch always tries to execute this task file first and any other task file is stored in the \QUEUE folder. This may lead to the unwanted execution of old task files or, if the execution is no longer possible, it prevents TerraBatch from doing anything. It's also a good idea to clean up any old files from the \PROGRESS and \QUEUE folders.

## Number of Instances

TerraBatch uses one instance for processing one working segment. The use of multiple instances enables the parallel processing of several working segments on one computer. The number of instances used for TerraBatch processing may effect the processing speed and overall performance of a computer. There is no single value recommendation for how many instances should be used as it depends on many different factors, such as processor cores, hyperthreading, RAM and processing steps that are part of a task.

The user can set the maximum number of instances on different places in the software:

- in the [Batch computers category](#) of TerraScan **Settings**
- in the [TerraBatch Task Settings dialog](#) of the **Macro** window of TerraScan
- in [TerraDispatcher](#) while a task is running

On the master computer, you can verify the suitability of the settings with the help of the Windows **Task Manager**. Start the **Task Manager** while a task, such as a macro is running on the computer. Check the CPU and RAM usage against the following recommendations:

- RAM usage should never reach 100%.
- CPU usage should be about 50% for single-threaded tasks. Single-threaded tasks access the memory in a non-linear way and hyperthreading does not provide any speed improvement. Examples for single-threaded processing tasks in TerraScan are the ground classification, hard surface classification, by height from ground computation and classification, and others.
- CPU usage should be about 50-100% for multi-threaded tasks. Multi-threaded tasks access memory in a linear way and hyperthreading speeds up processing. Examples for multi-threaded processing tasks in TerraScan are surface classification, normal vector computation, and others.

If the CPU/RAM usage on your master computer is not optimal, modify the number of instances in TerraDispatcher. The **Task Manager** will show the effect.

The use of more than 4 instances may not lead to a significant speed improvement anymore. A test with two different processor types showed that a value > 4 instances increases the



processing speed only at a very low level. For a 14-core processor, the optimal number was 8 instances, while for a 32-core processor, the optimal number was 12 instances.

## TerraBatch Preferences File

The Preferences File stores user preferences for running TerraBatch on batch computers. It enables the automatic request of a license when TerraBatch is launched and limits the number of threads used for TerraBatch processing.

TerraBatch has no user interface. You can modify the preferences by editing the TBATCH.UPF text file in any text editor. The file is located in the installation folder of TerraBatch, by default C:\TERRA64\TBATCH\TBATCH.UPF.

VARIABLE	DESCRIPTION
Application	TerraBatch – do not modify.
LicDir	Location of license files. By default C:\TERRA64\LICENSE
LicUseServer	If not zero, requests a license from license server. Set this to 1 for automatic license request.
LicServer	License server computer name. Obligatory if LicUseServer is not zero.
LicAccess	Access code for license server. Obligatory if LicUseServer is not zero.
RunTasks	Historical – do not modify.
MaxThreads	Max number of threads. Value of 0 or -1 means all processor cores. 4 is a recommended value for a high-core Batch computer in order to avoid that the computer becomes non-responsible, even if the number of instances for processing tasks is set to a higher number.

## Installation Directories

TerraBatch may share the same directory structure with all Terra applications. It is recommended that you install all Terra applications in the same directory.

The list below shows the directory structure for TerraBatch if it has been installed in path C:\TERRA64. TerraBatch relies on this fixed structure in order to work properly.

C:\TERRA64	installation directory for Terra applications
license	user license files
tbatch.lic	user license for TerraBatch, required for a batch computer
tscan.lic	user license for TerraScan, used by TerraBatch on the same computer
tphoto.lic	user license for TerraPhoto, used by TerraBatch on the same computer
tmatch.lic	user license for TerraMatch, used by TerraBatch on the same computer
tbatch	TerraBatch application files and sub-folders
progress	temporary progress reports
queue	working segments passed to TerraBatchService
reports	final processing reports
task	active task files
ncsecw.dll	DLL for ECW/JPEG2000 support
TerraDispatcher.exe	TerraDispatcher executable
TerraBatch.exe	TerraBatch executable - no graphical user interface
tbatch.upf	TerraBatch user preferences
tbatch_service.exe	TerraBatchService executable - no graphical user interface

## - M -

### Macros

Run macros 13

## - T -

TerraBatch 6, 13

Installation 8

Preferences 18

Requirements 7

Setup scenarios 11

TerraDispatcher 13