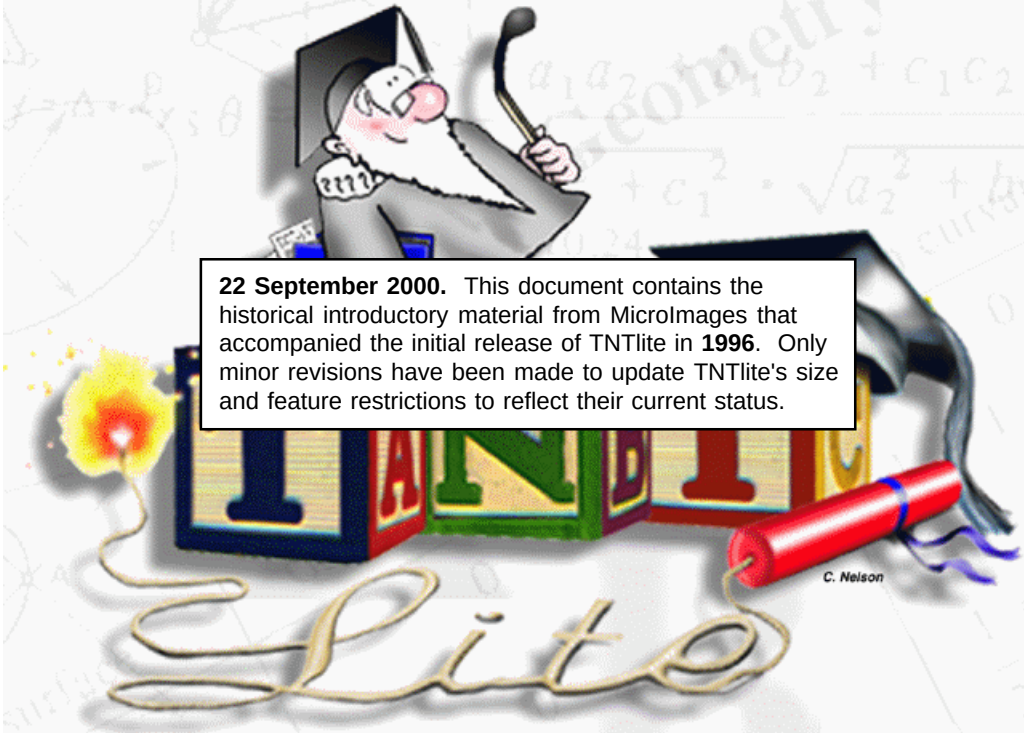
Introduction to

TNTlite



22 September 2000. This document contains the historical introductory material from MicroImages that accompanied the initial release of TNTlite in **1996**. Only minor revisions have been made to update TNTlite's size and feature restrictions to reflect their current status.

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Announcing TNTlite™

Introduction

MicroImages is creating a new set of rules to define spatial data analysis by giving away, *FREE-OF-CHARGE*, its advanced software for use by students and for small projects! Please note that throughout this **MEMO** the word student should be interpreted as meaning both traditional and non-traditional students. The objective of our release of the *FREE* **TNTlite** versions of the **TNT** products in **V5.30** is to greatly expand the horizons of spatial data analysis around the world at all levels from high school students to the professional manager and scientist.

MicroImages can no longer use the narrow concepts defined by others to describe our products and what we plan to accomplish. "Geomatics" is a good term, but is not yet widely used outside of Canada. So, for the sake of better terminology, what we are all doing is "spatial data analysis". Notice that this phrase is all lower case, since it refers to an objective and goal, and is not a vendor or discipline-defined approach, product, or group of software techniques. **GIS**, **IPS**, **CAD**, desktop mapping, desktop map making or cartography, business geographics, and so on, are all examples of some of the narrower, historical, and discipline-oriented spatial data analysis activities designed for specific objectives and applications within specific disciplines.

Now that we have defined this broad general technological approach for ourselves, how can we get everyone to accept and use it? Other software manufacturers have attempted to force upon us their narrow concepts of image processing or **GIS** by widely circulating demo disks with captured data sets; giving away "free" unsuccessful, outdated, or older view programs; capturing students at specialized academic sites; and other similar marketing-oriented ploys. The problem with all these efforts is that they promote very narrow visions of **GIS**, **IPS**, and so on; are restricted in access to a chosen few; or you cannot really do anything with them.

MicroImages' TNT products were regrouped in two categories with our 38th quarterly release March 1996. TNT professional products are those used by our professional clients and from which MicroImages will continue to derive its operating revenue. The new TNTlite products are focused upon advancing spatial data analysis via students and small projects. These TNTlite products are available FREE for use by anyone, anywhere, with no restrictions on their use and

distribution.

Some of the material and sections of this special MicroImages **MEMO** are directed toward an explanation of the impact these new *FREE* **TNTlite** products have on MicroImages' professional clients. Other sections will assist our clients and the many others who are interested in learning spatial data analysis in understanding the objectives, value, application, limitation, installation, and other characteristics of the *FREE* **TNTlite** products.

What is it?

The **TNTlite** version of **TNTmips** is a *FREE*, unlimited use product which has all the functionality of **TNTmips**, but is limited in the size of the spatial objects it can read and write. The **TNTlite** version of **TNTview** is similar. Both of these **TNTlite** products are intended for educational use by students or by professionals who wish to learn about, or experiment with, the application of spatial analysis techniques in their day to day endeavors. Here are just a few of the unique aspects of the **TNTlite** products:

- The **TNTlite** products do not have built-in time limits!
  Use them as much and as long as you like.
- You are not confined to using the sample data prepared and supplied by MicroImages or anyone else!
  You are provided with all the tools needed and encouraged to prepare your own data for your own projects.
- You are not restricted to using **TNTlite** on a specific computer platform!
  *Try them on a **PC**, Mac, and workstation--master their use on one computer platform, and you will immediately be able to use them on any other common type of computer.*
- Projects and the spatial materials you develop can be moved and used without conversion between **PC**s, Macs, and **UNIX** workstations.
  *The unique Project File used to store your materials can be moved from one kind of platform to another (e.g. via network) and immediately used in another **TNTlite** without any kind of conversion.*
- Network support is built-in, and these products can also be run remotely over a **LAN** or Internet.
  *Operate completely from your desktop **PC**, Mac, or **X** terminal using a **TNTlite** product executing on some other kind of computer and with your Project Files located anywhere.*
- You can save your results for future use and even print them out in color.
  Save your results in Project Files on your local or any network computer. Print what's on your screen in color via Postscript, Microsoft Windows, or MicroImages' special printer drivers.
- The **TNTlite** products provide the same functionality and upgrade cycle for new features as the corresponding **TNT** professional products.
  FREE quarterly upgrades via the Internet (or obtain a new CD).

- You are free and encouraged to use the **TNTlite** products on any data sets and projects which you can design within their size restrictions.

  *Let your imagination take you where it will. If you can earn income by your skills in the use of the **TNTlite** products, then so be it.*

- In fact, MicroImages will not even know you are using the **TNTlite** products since there are many free ways to acquire them.

  *It is MicroImages' hope that your knowledge of the use of these FREE products will actually become a part of your career tools and that some of your projects will eventually grow large and complex enough to need our **TNT** professional products.*

Sound too good to be true? You will find that the **TNTlite** products are self-contained and complete. However, you will also find that you must be realistic in your expectations of a very powerful, yet *FREE* product when sizing your project and materials. If these limits are factored into your project's design, the **TNTlite** products will allow you to complete any kind of project that could be completed in the corresponding **TNT** professional products sold by MicroImages.

Why have it?

Current situation.

For the last couple of decades, one or two companies have defined in rather narrow terms what spatial data analysis is all about in each of its subcomponents; especially **GIS**. For years these companies have unilaterally defined the objective, interface, focus, functionality, the expensive computer platform centralist or empire approach, product costs, and other factors which in turn placed some rather restrictive bounds on the concept of spatial data analysis.

Ease of use, distributed use, real cost, student and professional preferences and working habits, setting universities against local businesses, and similar factors were not important in the development of these "historical" software products which are still widely used. Thus, their software design, lack of software modernization, and corporate objectives, coupled with the lack of sufficient "local" or distributed computer power, have until recently confined spatial data analysis (especially **GIS**) to a few "empire" locations.

Suddenly, vast storehouses of public spatial data (maps, data bases, imagery) are becoming freely available to all of us, or at nominal charges, in public formats via **CD**s and Internet. Also many private sources of current and pending high resolution photo and satellite imagery are going "on line". In response, many new software paradigms and associated products and marketing are becoming available and spreading widely. All of this makes it very clear that interest in spatial data analysis is about to explode.

MicroImages' response.

MicroImages has been criticized for 10 years for having advanced spatial analysis products for the **PC**, but not responding to the marketing methods of those who dominated the field with their workstation empire-oriented products. Most of

this criticism was focused upon why we did not grow our own clients by subsidizing academic and newcomer use of our products. MicroImages answered by pointing out that a small company with **PC**-based products cannot use, manage, or match such marketing methods of its larger competitors selling expensive software for workstations and their multi-user software management features. For example, large companies rely upon many factors, including their many branch offices and large installed client base, to promote and provide support to their many free "seed" sites and their transition into paying customers.

Correspondingly, for complex products, giving away demo software must provide some value to its recipient in order to be worth learning. This is easily demonstrated by the large number of demo software **CD**s accumulating in your possession. They create a lot of marketing hype and quickly become used as pretty drink coasters.

An even more general answer to all these past suggestions is that a new product concept and company, no matter how advanced, must use new, innovative marketing methods against existing products from larger companies who can literally buy new client sites. MicroImages has already proved it is a leader in the application of the new technologies being applied to spatial data analysis. By introducing **TNTlite**, MicroImages is making new marketing rules for everyone.

These new, *FREE* **TNTlite** products respond to the emerging situation where students and professionals have, or are acquiring, personal computers with **CD-ROM**s, displays, and memory which, for single task performance, equal those of their universities or employers. Spatial data analysis is no longer an expensive, captured activity whose rules and bounds are established by a few individuals and institutions. Over the past decades we have all worked hard to break away our computer and software needs from unenlightened central control. It is now time that we all have a say in what spatial data analysis software we use and when, where, and how it will be applied.

In high schools?

When should students be introduced to spatial data analysis? More and more far-thinking people are pointing out to MicroImages that it should start in high school and possibly even earlier. Young minds are already:

- flying through video games,
- playing Carmen SanDiego,
- reading road maps,
- figuring out where their home is relative to the fast food franchises,
- puzzling over vertical air photos and satellite images,
- wrestling with geography,
- navigating cars and the Internet, and
- encountering many other situations which require an understanding of spatial relationships.

Their homes and schools are also beginning to acquire computers of sufficient

capacity to run modern **3D** games, and which are thus suitable to compute and display serious spatial information.

The **TNTlite** products are *FREE*, as these schools and students will not spend money on expensive software products! Beyond the availability of the *FREE* **TNTlite** products, three additional requirements still remain if the concepts of spatial data analysis are to spread to these young minds.

1) MicroImages must continue to work to make the complex processes in the **TNT** products even easier to understand and use.

2) Creative individuals need to design and distribute course syllabi and tutorials including "bite-sized" demonstrational spatial data sets. These should be accompanied by guidelines describing to teachers and students how to assemble similar spatial data sets from the free materials that cover the areas of their local school districts.

In the last year, some of these creative individuals were at work at MicroImages preparing and illustrating Getting Started booklets which come with TNTlite. These booklets are designed as tutorial exercises which will acquaint you with the features in TNTlite and how to use them. At least 40 of these booklets will eventually be required to provide a beginning self study course in using the TNTlite products for geospatial analysis. Check the MicroImages Web site (www.microimages.com) to see the titles now available and to review the most recent color copies of these booklets.

3) Finally, we have to do 1) and 2) above in such a way as to convince children or young adults that spatial data analysis (i.e. geography, map reading, navigation, image interpretation, etc.) is just another kind of video game!

In major universities.

Major universities with graduate programs are always short of funds for capital equipment and have even less for expensive software or for many copies of that software. But, these same universities still buy things, compete for projects, fund upgrades, and matriculate a few spatially trained individuals. However, due to internal funding inequities, these activities are often limited to one or two prosperous and often quasi-commercial departments. Thus, their approach to spatial data analysis is often that which furthers the professional and/or business interests of that department.

Many new academic programs are now interested in exposing their students to spatial data analysis techniques. Under the current situation they are forced to send their students into the specialized courses of these other departments rather than integrating them into existing courses. The few interested students sent off into the courses of other departments are then often exposed to complicated software selected for the professional objectives of that department and discipline. The attempts to use engineering-oriented **CAD** systems and training for complex spatial tasks is a good example of this misfit education. Furthermore, upon completion of these **GIS-**, **IPS-**, or **CAD**-oriented courses, the students have no way to follow-up on the continued use of these technologies in the remainder of their education.

Somehow, somewhere along the way, on their own initiative, many students in professional fields acquire skills in word processing, spreadsheet analysis, statistical analysis, database programming, and related techniques. These are then applied on their own computers in their professional courses and projects. The **TNTlite** products offer the opportunity to add spatial data analysis to their bag of professional tricks.

In smaller institutions.

MicroImages has had 10 years of experience with the sale and support of its low cost **PC**-based products to small, four year colleges and universities. For much of this period there were few alternative professional products available for use on their lower cost **PC**s. Regardless of how cheap the other professional products were, a single workstation and its maintenance easily exceeded their budget. Occasionally some university or college would obtain a one-time financial windfall (e.g. lottery proceeds, a sponsor, a bequest, etc.) and set up a **PC** lab with one, or usually multiple units of **TNTmips** software. Even under these fortuitous conditions, they were almost all unable to continue to maintain these software products and never had the funds to upgrade their computers. As a result, some of these clients are still using software and computers we delivered four, five, or even more years ago (an eternity in this business).

The only software solution that fits these kinds of small institutions is one that is *FREE!* Not only *FREE* to the institution which may have the computers, but also *FREE* to their students because they do! There are hundreds of these small, local four year colleges, universities, trade schools, and community colleges for each major university with graduate programs conducting paid-for research and development. Furthermore, it is these local academic and training programs which must supply most of the technical staff for the local municipalities, counties, and businesses that are beginning to use spatial data analysis.

College students who learn to use the **TNTlite** products will proceed at their own pace, on their own computer, and at their own location. They will also take their new knowledge and techniques to each new class and application and then smoothly, without interruption into their professional or technical careers.

For working professionals.

Professionals are always busy in the daytime "doing their thing" earning their living. Learning new concepts to extend one's career always requires "home time" where you can control the pace, approach, and level of concentration. Personally acquired professional skills should also transcend employers. This is assured if both the computer and software are your personal property (e.g. the **TNTlite** product) and/or because it can be acquired at reasonable cost by a new employer (the **TNT** professional products) for the available computers.

"Paid for" professional training in **GIS**, **IPS**, desktop mapping, etc. makes little sense when you cannot subsequently, freely and easily, continue to practice that classroom learning. Most professionals learn by experiment by designing and completing projects in their personal interest area. Didn't you learn word processing because you couldn't write fast enough by hand, and secretaries are no longer widely available? You learned to do spreadsheet analysis because it was easier

than writing **BASIC** programs or waiting for someone else to do it for you. You taught yourself to use a **CAD** program because you were tired of drawing and redrawing things by hand. Expanding from your **CAD** or other related experience into spatial data analysis can be accomplished using the *FREE* **TNTlite** products and the same personal initiative!

What are the limitations?

Carefully selected limitations have been placed on the **TNTlite** products. You can use them to learn all about spatial data analysis and therefore **GIS**, image processing, **CAD**, desktop mapping and cartography, and so on. However, in most cases you will not be able to do a large scale project which would compete with those professionals, consultants, and organizations who purchase the **TNT** professional products to earn a living and maintain a successful business.

What can I do?

Approach your review of the limits in the *FREE* **TNTlite** products optimistically by first getting a glimpse of what you can do. Using **TNTlite** products, a student or professional learner can:

- prepare a plan for a city block but not for a city
  *(by combining a collection of **TNTmips** processes),*
- interpret and make measurements for part of an airphoto but not all of it
  *(via measurement tools, **CAD** sketching, or the Object Editor),*
- classify a subsection of a multispectral satellite image
  (via the many different automatic image classification methods),
- design and print a readable image and/or map on a low cost color printer
  (via the 11" by 17" color map layouts),
- interpret any number of airvideo images
  *(via quick **CAD** sketching or the powerful, interactive Object Editor),*
- visualize and analyze a random collection of **XYZ** data points
  (via Kriging or any of the other surface fitting processes),
- map features from any number of color airvideo images
  (via the unique Feature Mapping Process specially designed for airvideo interpretation),
- use all types of spatial data in any map projections and datum
  (via automatic, built-in conversions),
- interrelate your various spatial data sets
  (by georefencing each data object),
- alter and improve the internal geometry of your data, images, and maps
  (via the processes available to warp any spatial object type),
- create theme maps for the states or provinces in a country
  (with the easy theme mapping features in the display processes),
- create theme maps of counties in a state
  (with the easy theme mapping features in the display processes),

- create theme maps of census tracts in a local area
  (with the easy theme mapping features in the display processes),
- create theme maps for the enumeration districts in a county
  (with the easy theme mapping features in the display processes),
- pin-map database locations into a city/county map, image, or theme map
  (by using the pin-map features in the display process),
- view your 3 dimensional data sets in perspective and stereo
  (via the display process and for stereo using red-blue anaglyph or other inexpensive stereo video game glasses),
- import images, **CAD**, and topological vectors from many other sources
  (import many kinds of public and commercial data formats),
- compute relationships between landscape features
  (learn how to use buffer zones, querying a data base to control how spatial features are displayed, compute cost surfaces, etc.),
- convert point data in databases into spatial features
  (via polygon fitting or home range),
- add your own spatial analysis features
  *(via the Spatial Manipulation Language [**SML**] which allows you to create your own scripts to analyze and display spatial objects as variables),*

and so on and on, interactively using everything in the over 100 megabytes of integrated processes in the **TNT** products.

What are my project design limits?

The Project File is the heart of the **TNT** products. The Project File is simply a single computer file which contains as much or as little of your project materials as you choose. The objects which make up a Project File contain spatial information and associated subobjects which act as adjectives to describe them.

You can have as many Project Files as you like.

You can have as many spatial objects in a Project File as you like.

You can add or delete objects from a Project File whenever you wish.

You can display and edit all the objects in a Project File.

Objects can be copied between Project Files at any time.

Objects can be increased or reduced in size as long as they stay within the size limits established for the **TNTlite** products.

But, the **TNTlite** products will not read or write any individual object which exceeds the following limitations.

Raster Objects.

A raster object usually contains an image or a map. It is an array of cells of data values which can be from 1 to 128 bits in size and encoded to represent a wide variety of data types (binary, integer, real, color composite, imaginary, etc.).

The maximum size for each raster object is 314,368 cells, with a maximum

dimension of 1024. Thus 1024 x 307, 614 x 512, and 307 x 1024 all fall within the lite limits.

Vector Objects.

A vector object usually contains map and other line materials upon which rigid topological rules are imposed (e.g. any area represented may only be contained in a single polygon). All coordinates of the points defining a vector object are double precision.

The maximum counts for the elements in each vector object are

500 polygons,
1500 lines,
500 isolated points,
1500 labels, and
no limit on nodes.

CAD Objects.

A Computer Aided Design (**CAD**) object usually contains engineering-oriented drawing and other line and geometric shapes whose current use does not require topological constraints (e.g. from a spatial analysis viewpoint, **CAD** objects are often thought of as containing a lot of independent lines and geometric objects). All coordinates of the points defining a **CAD** object are double precision.

The maximum counts for the elements in each **CAD** object are

500 elements--lines or geometric shapes and
5 blocks.

TIN Objects.

A Triangular Irregular Network (**TIN**) object is made up entirely of triangles whose spatial orientations and connections represent some or all of a 3 dimensional surface. A **TIN** object also has rigid topological constraints whereby none of the area internal to any one triangle can be shared with another. All coordinates of the points that define a **TIN** object are double precision.

The maximum number of elements in each **TIN** object is a function of the nodes:

1500 nodes.

Relational Database Objects.

A database object is made up entirely of interrelated tables that contain records made up of data fields. If one of the tables contains some kind of **X-Y**, latitude-longitude, or other spatial coordinates, or the information from which they can be inferred (e.g. street address), then it can be an independent spatial object. If none of the tables contain a means of spatially referencing the table, then they contain attributes associated with the contents of other objects (e.g. the cells in a raster object, elements in a vector or **CAD** object, triangles in a **TIN** object, or the records in another database object). Any kind of data can be stored in a database field (e.g. numbers, characters, comments, etc.).

The maximum sizes for each database object are

1500 records/table.

Limits on Peripheral Device Support?

The following additional limits are imposed upon the **TNTlite** products but not in the **TNT** professional products.

Printing is limited to:

color printing of map layouts up to 11" x 17",
screen snapshot directly to the printer of 1280 by 1024 pixels,
maximum output size of 11" by 17",
printing larger than above sizes or using multiple pages is not provided,
no output to print elsewhere via **TIFF** or **TGA**, and
no indirect printing by saving print files.

Plotting is limited to a maximum area of 11" by 17".

Digital film recorders are not supported.

Analog film recorders which tap onto the video outputs of your display device can easily be used.

X-Y digitizers of any type supported by the **TNT** products can be used. The amount of information which can be digitized is limited by the maximum size of the **CAD** or vector object which can be created.

Scanners and Digital Cameras of any type supported including those automatically supported via their generic **TWAIN** drivers can be used. The area of the image which can be scanned or captured is limited by the maximum size of the raster object which can be created.

Video capture can be done if the hardware device is supported by the **TNT** products, which is currently limited to some Windows 3.1 and Windows 95 or to devices which come with a **TWAIN** driver such as the Snappy. Video capture devices which cannot capture images of less than the 314,368 cell limit for a raster object will not work. Under these circumstances, capture the images outside the **TNTlite** products into a **TIFF** format, reduce the size of the **TIFF** image, and then link to or import the **TIFF** image into a raster object.

Tape devices are not supported directly within the **TNTlite** products. Simply use some other software to move your tape files onto your hard drive, and then import them into the appropriate types of objects in your project file.

Limits during Processing?

The following additional limits are imposed upon the processing activities available within **TNTlite** products but not in the **TNT** professional products. These limits have all been set liberally enough so that they allow all kinds of powerful analysis to be completed. It is unlikely that you will find these constraints as limiting in your projects as the object size limitations outlined above. However, for your reference these limits are:

Displays may be any resolution and use multiple screens but are limited to:

10 groups/view,
20 layers/group, and
200 total layers.

Map and Poster Layout is limited to 11 x 17-inch color printing and plotting.

Raster Combinations (linear, multilinear regression, principal component analysis, progressive transform, decorrelation, and so on) may each use a maximum of only 8 input rasters.

Feature Mapping allows a maximum of 8 classes (e.g. wetlands, plowed fields, and open water bodies) and a maximum of 100 features (individual ponds, etc.).

Automatic image classification is limited to a maximum of 8 input rasters which will accommodate all **LANDSAT TM** bands or reduced numbers of bands for multi-date images sets.

Importing of all formats supported by the **TNT** products is available. However, the multi-file production-oriented importing in the **TNT** professional products is not available.

Exporting privileges are not available. It is not the purpose of the **TNTlite** products to provide data translation from one to another *FREE* or commercial software systems. [Note: Export processes were enabled beginning in TNTlite 2006:72]

Batch job features used in production applications of the **TNT** professional products are not available or needed.

Design Problems?

Many **TNT** processes cannot determine the size of their output objects ahead of time. This is especially true for processes which create new vector, **CAD**, or **TIN** objects. For example, it is not possible to forecast the number of elements which make up a new vector object created by merging two overlapping vector objects which fit within the **TNTlite** limits. The limited numbers of polygons in each input object may cross those in the other many times. The new vector object has an unknown number of new polygons whose count can be determined only when the process is underway. Under these conditions you will not know about this until the **TNTlite** process reaches the limit, or when it attempts to write the new object. At this point you will be notified via a window of this problem and will need to resize your input objects or the complexity of your analysis.

The object sizes you will be using in your **TNTlite** projects are small in comparison to those processed in the **TNT** professional products. It is not uncommon in professional projects to use individual rasters of up to 20,000 by 20,000 cells (scanned map), a vector or **CAD** object of 100,000 elements (a county **TIGER** file), and so on. Very careful software design has been required to provide the performance needed to handle the analysis of these huge objects on a **PC** or Mac with 16 megabytes of memory in a reasonable amount of time. With the size limitations on objects used within the **TNTlite** products, you will find that most of your analysis steps will take only a few seconds. Thus, the fact that these processes are not able to warn you in advance that they will exceed the size limits of the output object will not be particularly onerous.

The **TNTlite** products are gradually becoming more friendly and helpful in handling these size limitations. Future releases will contain even more features designed

to help you through these limitations--in other words, to "parachute" you out of situations where the object size limitations are encountered.

Impact on TNT professional products?

MicroImages does plan to go on selling **TNT** professional products and use that revenue to remain in business and expand all the **TNT** products to everyone's benefit--organization, professional, or student. Thus the **TNTlite** products have been carefully designed to protect your investments in the **TNT** professional products as well as ours. It is unlikely that a **TNTlite** product can be used to complete a project of sufficient size to compete with your livelihood. There will be some leakage in this area as MicroImages wants the **TNTlite** products to be truly unique and usable. For example, the projects of some professionals and disciplines may always be small enough to fit within the **TNTlite** limits.

Special Safeguards?

Certain other subtle, but important safeguards, have been built into the **TNTlite** products for your protection. These provisions have minimal impact on the *FREE* student and learning objectives of the **TNTlite** products.

In summary:

- Any Project Files created in your **TNT** professional product can be accessed by any **TNTlite** product.
- Any object created in your **TNT** professional product can be accessed and used in any **TNTlite** product if it meets the size restrictions.
- Project Files or individual objects created in the **TNTlite** products can be used in your **TNT** professional products.

IMPORTANT CAUTION: The data sets you create in your TNT professional products PRIOR TO VERSON 6.4 should be duplicated before you experiment with them in the TNTlite products. Probably all your objects will be too large to even use. However, once an existing object has been altered by a TNTlite process, its use is restricted to TNTlite. This might result from editing a single line in a vector object and saving it back into place (which is unwise at best), altering or adding an attribute table, creating a new contrast table, and so on. You can always delete the new or altered subobject to regain access.

Possible Opportunities?

The **TNTsdk** (Software Development Kit) is not available as part of the **TNTlite** products. However, if you are using **TNTsdk**, you can create a custom process which can be used freely by any **TNTlite** product as long as its application meets the **TNTlite** size and other restrictions. As usual, this same custom process would also run with any professional **TNTmips** without these restrictions.

SML (Spatial Manipulation Language) scripts can be developed and used in the **TNTlite** version of **TNTmips** as long as they use objects which meet the size limits. The identical **SML** scripts developed in the professional version of **TNTmips** will also work with the **TNTlite** products. MicroImages has proposed to some professional clients that a means can be developed to encrypt their

SML scripts so that their confidential procedures are protected, hidden, and tied (or not) to the **TNTmips** professional software license keys.

Positive Impact?

MicroImages hopes that the introduction of the **TNTlite** products will benefit your objectives as wells as ours. If the **TNTlite** products stimulate expanded sales of the **TNT** professional products, then more funds will become available to even more rapidly expand product capabilities. More exposure of others to the applications of spatial data analysis should mean more work for those who have the professional products and know how, as some percentage of the **TNTlite** users will determine that they simply want to contract out this kind of analysis.

You, your organizations, and MicroImages are all encountering limitations in finding truly "spatially enlightened staff". More universities training more students will supply these kinds of trained and experienced staff. Unfortunately, the majority of the students who become seriously interested in **GIS** are being struck out of a 20 year old mold!

Finally, you can also now take your advanced learning of **TNTmips** home, where you can have a computer to play around expanding your spatial analysis skills at your leisure to the advancement of your professional career and business objectives. Simply convince your spouse, banker, or business that you need one more computer, chop down some of your innovative Project Files, and go at it.

Impact on MicroImages?

Is the creation, maintenance, testing, release, and distribution of the **TNTlite** products going to distract MicroImages from advancing your professional versions of the product?

The **TNTlite** products have been available for use since the Spring of 1996. Maintaining them and adding special features to enhance them each quarter takes only 5% of MicroImages' software development effort. For example, in the first year, we added features needed to smooth out the impact of the limits built-in to the FREE **TNTlite** products, allow 11 by 17-inch color map layout and printing, several Getting Started booklets with associated sample data, and so on. A review of the nature of the **TNTlite** products will reveal that they are simply variations on the advanced concepts designed into the **TNT** products over the past several years (e.g. **X** servers, platform independence, key control, common data structure, multi-lingual, and so on).

The impact of the release of the **TNTlite** products on MicroImages has been significant and positive. Professional clients have long asked for direct color printing in **TNTview** and **TNTatlas** which has been added for use as well in **TNTlite**. Continuing efforts to streamline and improve the **TNT** products' interface, especially for beginning and student users, has benefitted everyone. The increased publicity has increased awareness of the powerful **TNT** professional products and their sales. Increased publicity has also acquainted more of your public and clients with the many uses of spatial data analysis.

How do you get it?

Like a cold, **TNTlite** products are as easy to get as they are *FREE*.

You can obtain and use the **TNTlite** products and each new quarterly release via one of the following methods.

Internet.

Download the current version via **FTP** for your particular platform as they are posted on MicroImages' web site. This method requires no payment to MicroImages. However, since **TNTmips** averages about 100 megabytes in size for each platform, it is impossible to use this method unless you have a high speed Internet access to MicroImages from the computer you use. Many students do have access to a high speed link and may be able to use this method without charge. However, many businesses and professionals still use modems via which it would take days to **FTP** such a large set of files.

CD.

Order a **CD** containing the latest version for your platform via MicroImages' Internet home page or **FAX**. Shipping, handling, and material costs for each **CD** and the available Getting Started booklets must be paid in advance via credit card, check, or other financial instrument. Shipping of the **CD** is by airmail. Those in other nations who wish to have it shipped via air express will be charged correspondingly more.

Any other method.

Since the **TNTlite** products and their upgrades are *FREE*, the most recent versions can also be obtained by many other methods. A single **CD** of the current version can be copied or simply shared between students. Once you have installed from the **CD** (assuming you are not running the **TNTlite** products directly from **CD** to save drive space) you can pass the **CD** along to someone else. Several students can thus share a single copy. When a version is **FTP**ed to a network site, it can then be copied to any similar computer on that network. Please also note that **TNTmips** can be operated remotely so that it can also be installed on a single computer which can multitask, and thereby be accessed remotely by multiple users.

MicroImages has found that the **TNTlite** products and their upgrades circulate freely by whatever electronic methods are available and suitable. However, it is suggested that you also copy the installation process for the current version for your particular computer platform. Then devise some way to use the installation processes to setup the **TNTlite** products on your hard drive such as from **CD-ROM** drive, from one hard drive to another, from a Zip drive to a hard drive, from a network server to the hard drive, and so on. This will provide an opportunity for the **TNT** installation process to set up the proper directories and take a look at your system setup. It is also possible in the future that it will be possible to directly install the latest version of the **TNTlite** products from MicroImages' Internet server onto your computer's hard drive.

How do you install it?

The **TNTlite** versions of **TNTmips** and **TNTview** are installed (or set up to run from **CD**) in the same fashion, and with exactly the same easy routines as were recently introduced for the **TNT** professional products on all platforms. For the Microsoft Windows versions simply RUN SETUP; for the Mac versions simply double click the install icon; or run the appropriate script for the appropriate **UNIX** workstation version. The very first choice on the first window for the Windows and Mac versions will determine if you wish to install **TNTlite** products or **TNT** professional products. Choosing the **TNT** professional products option will allow you to proceed with the already familiar **TNT** installation process. Choosing to install the **TNTlite** products will lead you through a series of explanatory windows to the final installation window.

Should you experience difficulties with your installation process, please consult the INSTMAN.TXT file on the **CD**. This contains the detailed installation manual provided in printed form with each **TNT** professional product. It also contains helpful hints on how to optimize your computer and operating system for use with large complex software such as the **TNTlite** products.

A totally open, *FREE*, and unique distribution method is being applied with the **TNTlite** products. MicroImages expects the **TNTlite** products to move around the world, not only by convenient **CD**, but also via Internet and by floating around on organizations' **LAN**s and **WAN**s. As a result, MicroImages will have no control on how or where the **TNTlite** products circulate around the world.

There is no hope, or need, that the associated paper reference materials that introduce and accompany the **CD**s containing the **TNTlite** products will stay with them. Therefore, the only sure way to communicate with the final user of the **TNTlite** products is via the installation process using the built-in screens.

You will find that each of the **TNTlite** special installation windows must at least be exposed, and hopefully read, before you can proceed to the next window, and finally on to the actual installation choices. If you have copied all the electronic pieces of the **TNTlite** products, then they will have everything you need: installation process and the information it exposes, analysis processes, sample data sets, and the reference manual including the Microsoft Word files. If this is not everything needed for a smooth installation regardless of how you obtained these pieces, then future versions will add it!

It is possible that some installations will be by “lateral” methods whereby a working system is transferred by disk or network to another computer without going through the regular installation process. While this can be done, it is not advisable, as the checks of your system made during installations will be bypassed and all the reference files (color depth, screen size, and many more) will still be set up as for the source machine. However, since this can be done, some of the same information will be built into mandatory startup screens in future versions of the **TNTlite** products.

Any manual?

Each quarterly release of the **TNT** products contains a completely new, integrated version of the reference manual for **TNTmips** and **TNTview**. It is not necessary or even possible to worry about inserts, collation, and addenda. Currently the quarterly upgraded, reference manual contains the equivalent of over 2400 printed single-spaced 8.5" by 11" pages with color illustrations.

The normal reference manuals available for use with the **TNTlite** products are identical to those provided for use with the **TNT** professional products. The **"A" CD** also provides the same complete, illustrated copy of this manual in Microsoft Word files for the Mac version 6.0 and the Windows version 6.0. Either of these Microsoft Word software versions can be used to print a copy of the manual with illustrations. Since the printed version of the manual is formatted and illustrated in over 2400 pages on 8.5" by 11" paper, it will take quite a lot of time, paper, and toner to locally print a new copy each quarter.

Any upgrades?

MicroImages releases a completely new version of the **TNT** products every quarter in March, June, September, and December. This release schedule has been kept 41 times. These quarterly upgrades are not patches to previous versions. Each quarter, a completely new set of processes for every platform is created, tested, reproduced, and distributed using a single set of programs on two **CD**s (the **"A"** disk for **PC**s and Macs and the **"B"** disk for **UNIX** workstations). This means that any process in the **TNT** products may be changed, improved, or extended during any quarter and will automatically become available for every platform. Many processes are little changed during the quarter, but others get major face-lifts, and new features and completely new processes are added.

Each quarter you simply erase your old **TNT** products and manuals and install the new ones from the new **CD** or downloaded files. Your existing Project Files and system setup characteristics are not altered and are immediately available in the new version. It takes 5 to 10 minutes to reinstall all of **TNTmips** from a 4X **CD** on a **PC** or a Mac. Reinstallation from the **"B" CD** using the scripts provided for each **UNIX** workstation is similar in nature.

The **TNTlite** products are exactly the same computer code and processes as their corresponding **TNT** professional products. Every change adding features or new processes to the professional versions of **TNTmips** will automatically be available when running the **TNTlite** version. Those who have purchased the **TNT** professional products pay a subscription fee quarterly or annually to obtain access to each successive quarterly version and the new features it contains.

Since the **TNTlite** products are *FREE*, their new quarterly releases will also be *FREE*. You can obtain the most recent quarterly upgrade (= new version) of the **TNTlite** versions of **TNTmips** or **TNTview** by the same method you acquired your previous version or any other available method. Visit the MicroImages Web site (www.microimages.com) to download the latest version. Each new quarterly release of TNTlite is posted for download along with new Getting Started booklets

and sample data. Print the Getting Started booklets on your color printer for a color version of these tutorial exercises and illustrations.

Any software support?

MicroImages is in the business of manufacturing and selling the **TNT** professional products. Our prompt, *FREE* software support is available only to the owners of our professional products!

TNTlite products provide no revenue for MicroImages and are offered as is. MicroImages will not be able to answer any questions about the installation, use, or application of the **TNTlite** products directly via phone, **FAX**, or letter. Limited support may be available via email when it does not interfere with the support of our paying clients. Any errors in the current versions of the **TNTlite** products which are repaired by MicroImages (i.e. patches) can be obtained electronically when posted for our professional clients on MicroImages' Internet server.

The very best way to get technical support for your institution or cluster of **TNTlite** products would be to set up a local group around a site which has purchased the equivalent **TNT** professional product. If the clients using that paid-for product cannot already help you, then they can use their access to MicroImages to obtain the answer for everyone in the cluster. Local access to a professional version of **TNTmips** can also be useful to conduct a full scale project, chop up big objects for use in student projects, and so on.

MicroImages' professional clients (as contrasted to **TNTlite** users) will now need to announce the license number of their professional products which currently is your software license key number, to identify themselves at the beginning of any voice, **FAX**, email, or other request for support.

Recap

MicroImages now has **TNT** products which are grouped into two areas: **TNT** professional products from which we derive all our revenue and which are used by our professional clients, and the **TNTlite** products which are focused upon advancing the use of spatial data analysis via student and small projects.

TNT professional products.

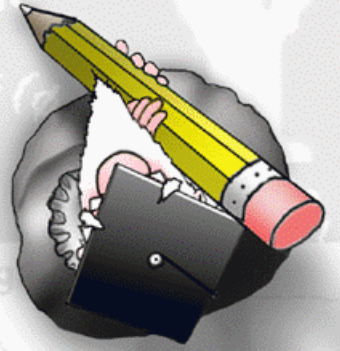
TNTmips, **TNTedit, TNTview**, **TNTserver, TNTatlas** as well as

TNTlink for **TNTmips** and **TNTsdk** for **TNTmips**.

TNTlite products.

- Available for **TNTmips** and **TNTview** only.
- **TNTatlas**, **TNTlink**, and **TNTsdk** are not available.
- *FREE* and does not require a software license key.
- No time limits on use.
- Install as many times and places as you want.
- Use the same compiled executables as the **TNT** professional products.
- Use the same installation processes.
- Download any version for any platform from MicroImages' web site.
- Alternative distribution available by **"A"** or **"B" CD**s for $25.

- No charges for regular quarterly upgrades. Simply download when posted, or order another **CD**.
- Can be used directly from **CD** with negligible drive space requirements.
- Documentation is available on-line.
- Printed documentation can be purchased.
- Limited technical support is available.
- Provides peripheral support within object size limits for
  X-Y digitizing,
  scanning,
  digital cameras,
  pen plotting, and
  printing.
- Will display a special promotional dialog each time at startup.
- May display special **TNTlite** help message dialog for each process.



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