A short introduction to Nina

NFT creation and rights management of digital visual art using Forctis DigiSign technology

Key features
v1.09

July 2021

Forctis

Aim of this presentation

- In this deck we showcase new file formats for the creation of digital visual art NFTs. They are part of our suite **Nina.**
- Nina has been conceived to facilitate the management and protection of IP rights through dedicated file formats, whilst granting would-be buyers of digital artwork the ability to enjoy it to its fullest. In turn, the wider public would also be able to access such digital art creations, but in a slightly degraded form.
- The formats have been called **NFTI** (or NFT for images) and **NFTA** (or NFT for animation). They embed a highly complex encryption protocol, un-hackable using known techniques, and a digital certification tag issued by its author, thus becoming a guarantee of authenticity and provenance.
- The files generated using Nina's protocol can be therefore copied or transferred by electronic means, but will only become accessible in undegraded form by a pre-determined number of owners, depending on the number of key tags issued by the author.
- Their deployment is platform-agnostic. Both files and public key tags can be distributed using DLT and blockchain-based protocols, or through traditional centralized marketplaces. Buyers generate their private keys independently.
- The combination of DRM, publicly-verifiable certification and encryption makes the NFTI and NFTA formats an ideal solution for digital artists wishing to retain full control over their IP in any type of marketplace or situation. For investors, beyond the enjoyment of each NFT piece it also facilitates their transaction in secondary markets (as you would do, say, with physical artwork on a canvas). Finally, the general public can also enjoy the artwork, but only in a slightly degraded form.

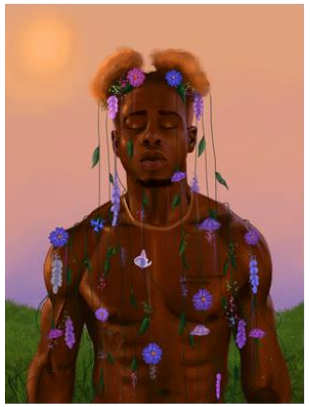
The very reason why we want to get it right both for visual artists and for investors in digital art

Wilmington, DE, April 2021. Photo and © by Karl Stomberg.

Snapshot of the process

A simulated example of how the technology works

1

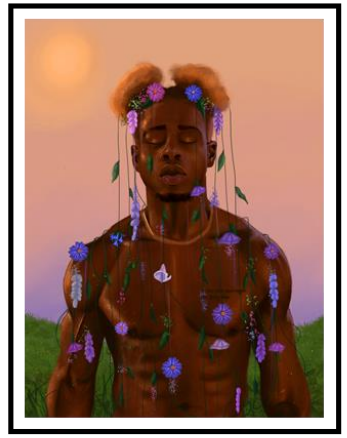


Mock-up example
Digital visual art
Escapism II
by Lethabo Huma
PNG 3000 x 4000 pixels

2

Its author creates an Electronic Signature File (ESF) to **digitally tag** the artwork using our DigiSign DCA protocol. This certificate proves its authenticity and provenance.

3



From the original PNG file, the author **generates an NFTI image file.** This file is digitally certified and encrypted, and it becomes accesible only by a certain number of decryption keys as determined by the author, thus facilitating its DRM.

DRM of the artwork

Buyer(s)

4

# of copies as granted by artist

Verifiable authenticity

Cryptographically protected

Platform-agnostic deployment

General public

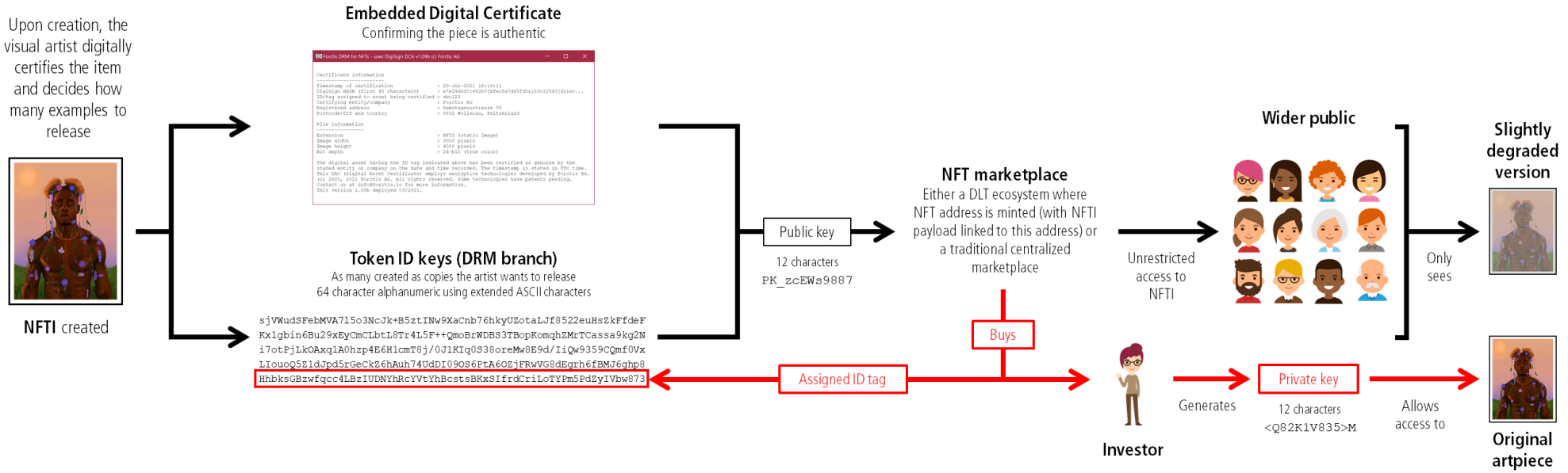
Accessible to anyone with public key

Slightly degraded version

Verifiable authenticity

5

Implementation



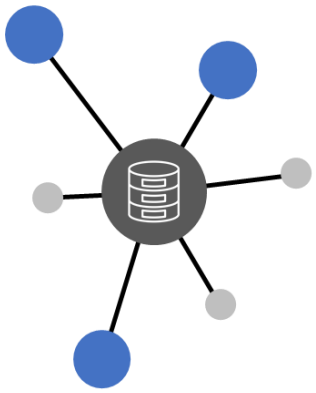
One NFTI having multiple IDs and co-keys (individually generated) for private access and a single public key for the wider public

No constraints to deployment nor access

Permissioned or permissionless ecosystems

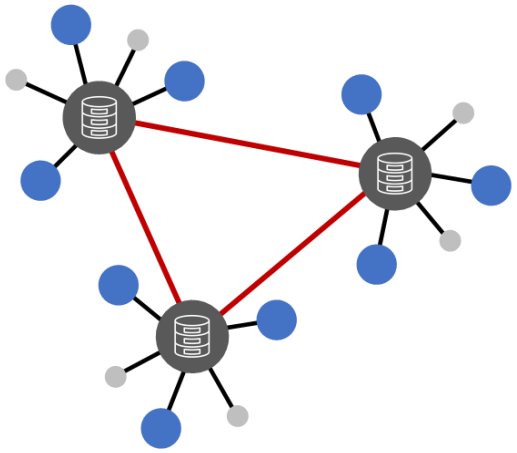
Centralized

Relies on a single server.
This is the classical deployment.



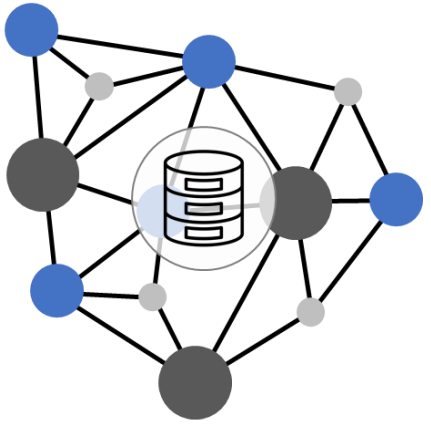
Decentralized

Components that operate on local (and possibly shared) information.

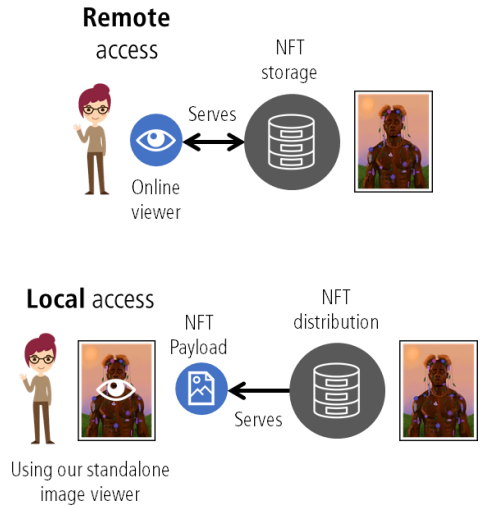


Distributed

Components that coordinate their actions to serve information.



NFTI access possibilities



Both the NFTI files and its KMS (Key Management System) alongside access and rights registration can be deployed through any type of architecture. The NFTI format is platform agnostic.

Access to buyers of an NFTI or NFTA

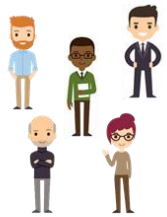
NFTI of original visual art **1 piece**

Token ID keys (or long keys)
Five individual accesses granted

Token ID keys (or long keys)	Private keys
sjVWudSFebMVA7l5o3NcJk+B5ztINw9XaCnb76hkyUZotaLJf8522euHsZkFfdeF	09O2UzqSKb9E
Kx1gbin6Bu29xEyCmCLbtL8Tr4L5F++QmoBrWDBS3TBopKomqhZMrTCassa9kg2N	3E<238948Mw7
i7otPjLkOAxqlA0hzp4E6H1cmT8j/0J1KIq0S38oreMw8E9d/IiQw9359CQmf0Vx	9*H(4&0zhOH2
LIouoQ5Z1dJpd5rGeCkZ6hAuh74UdDI09OS6PtA6OZjFRwVG8dEgrh6fBMJ6ghp8	47NL8QH6SQ97
HhbksGBzwfqcc4LBzIUDNYhRcYVtYhBcstsBKxSIfrdCriLoTYPm5PdZyIVbw873	<Q82K1V835>M

Cryptographically linked

NFTI buyers



Undegraded view of original visual art

Digital certificate

Access to the same artwork by the general public

NFTI of original visual art
1 piece

Token ID keys (or long keys)
Five individual accesses granted

```
sjVWudSFebMVA7l5o3NcJk+B5ztINw9XaCnb76hkyUZotaLJf8522euHsZkFfdeF
Kx1gbin6Bu29x[illegible]MrTCassa9kg2N
i7otPjLkOAxql[illegible]Qw9359CQmf0Vx
LIouoQ5Z1dJpd[illegible]grh6fBMJ6ghp8
HhbksGBzwfqcc4LBzIUDNYhRcYVtYhBcstsBKxSIfrdCriLoTYPm5PdZyIVbw873
```

Any of the 5 Token IDs

\+

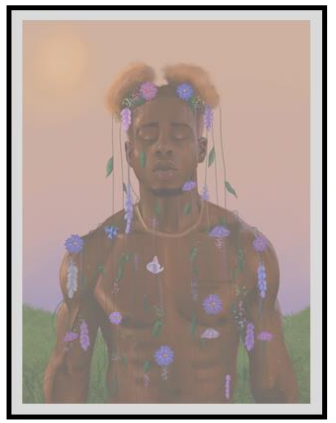
One public access key

PK_zcEWs9887 →

Wider public

=

Degraded view of original visual art



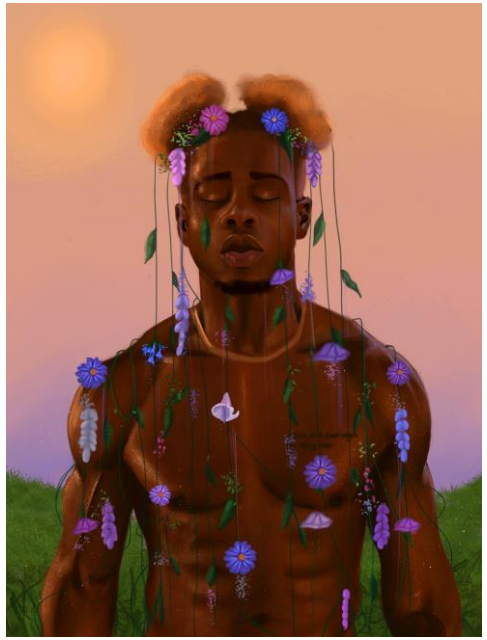
\+

Digital certificate

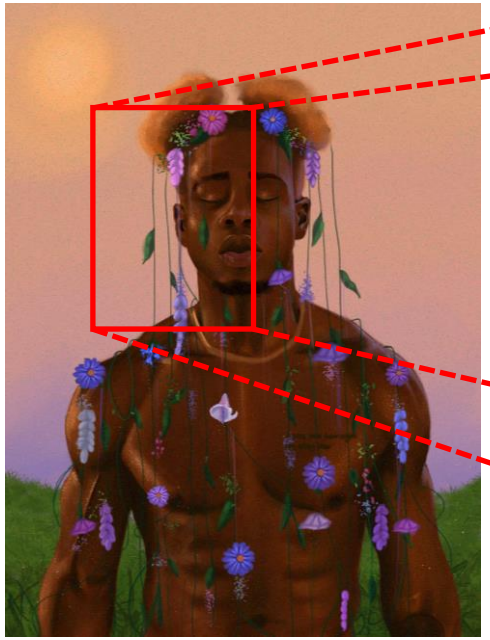
Image degradation

Injected artifact can be calibrated between 10% and 30% degradation

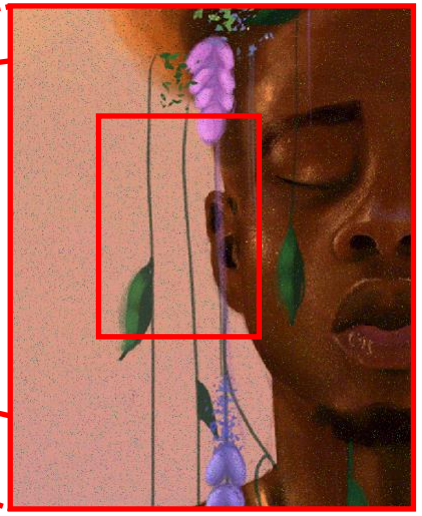
Original NFTI
Full resolution

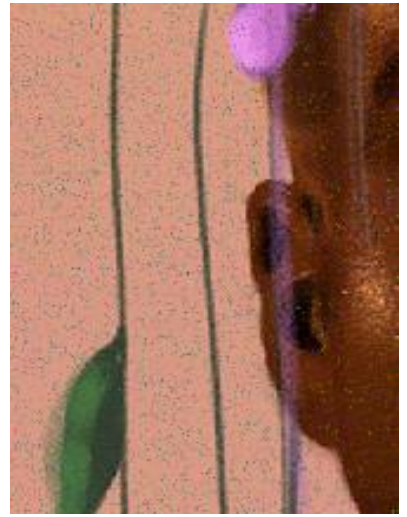


Degraded NFTI
Artifacts introduced



Degraded NFTI
Close-up at different magnification



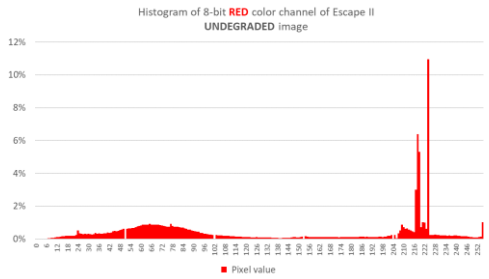


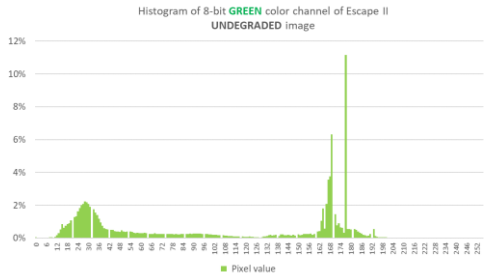
Degradation intensity can be manually when the artist generates the NFTI

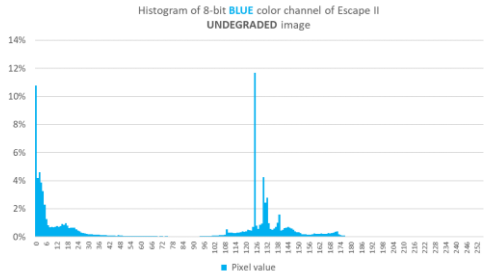
Image degradation is introduced by a proprietary algorithm, processing each color layer independently. The end result ensures the image is still easy on the naked eye but unusable for most applications (such as digital walls or digital reproduction) and is virtually impossible to remove.

Why we say that degradation is persistent?

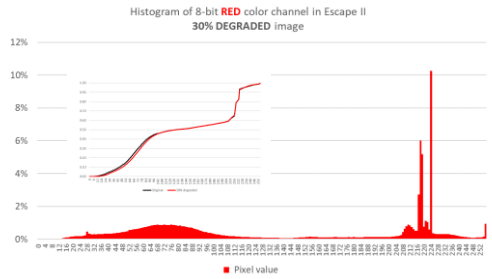
Undegraded image

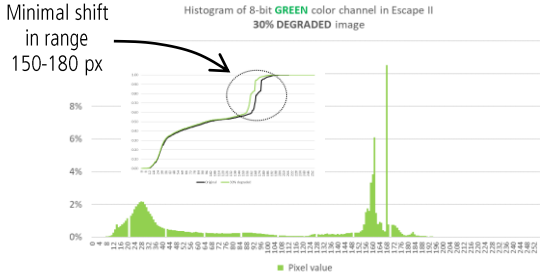


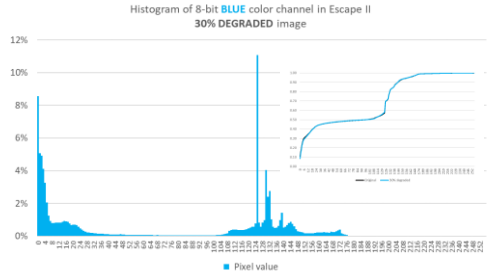




30% degraded image







Our algorithm injects random noise whilst trying to preserve the pixel (intensity) distribution in each color channel. The Escapism II example is a PNG image file having a color depth of 24 bits (8-bit per color).

In such way, it becomes virtually impossible to lift the noise artifact from an NFTI or NFTA file without noticeably distorting the original image.

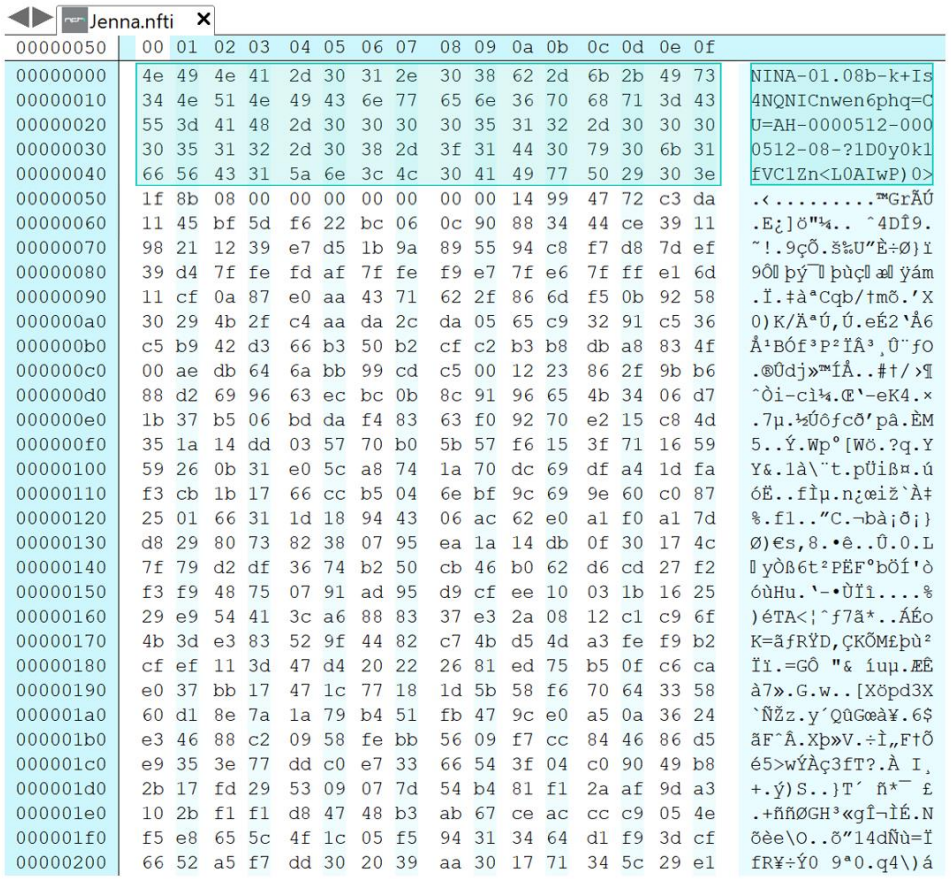
The NFTI created by Nina preserves both the resolution and the color depth of the original artwork file.

NFT for Images

NFT for Animations

Letters in a Sans Serif typeface derived from the Induction font by Typodermic.
Induction is © 2020 of Typodermic Fonts Inc.
NFT in white letters with ending “I” or “A” in Forctis Green #08ffe0
Backdrop in Lava Gray #5e686c

NFTI and NFTA file header structure



NFTI and NFTA header structure (80 characters long, 7 groups)

NINA-AAAAAA-VVVVVVVVVVVVVVVVVVVVV-0000000-0000000-00-HHHHHHHHHHHHHHHHHHHHHHH

1 2 3 4 5 6 7

Group	Descriptor
1	NINA (originator)
2	Platform version
3	Image integrity control tab
4	Image width in pixels
5	Image height in pixels
6	Bit depth
7	Certificate and data integrity control tab

Software components

E2E process

1 DigiSign DCA ESF file

Used by/for
Digital artist (or NFT minter)

Accesible from
Forctis AG infrastructure

Purpose
Issues ESF (electronic signature) for NFTI certification.

2 NFTI/NFTA creation suite

Used by/for
Digital artist (or NFT minter)

Accesible from
Stand-alone program distributed by Forctis AG

Purpose
Creates NFTI and NFTA files from the original media

3 PKG unlock code

Used by/for
Digital artist or minting platform

Accesible from
Forctis AG infrastructure

Purpose
Issues unlock code for key generator (PKG)

4 Private key generator (PKG)

Used by/for
NFTI/NFTA buyer (with unlock code)

Accesible from
Stand-alone program distributed by Forctis AG

Purpose
Generates PKG for unrestricted view of NFTI and NFTA files

5 Free image viewer for NFTI/NFTA

Used by/for
Anyone, for free

Accesible from
Stand-alone program distributed by Forctis AG

Purpose
Image viewer for NFTI and NFTA files

Addressing the NFT critics

As a reference point, we take David Gerard's entry in his blog *Attack of the 50 Foot Blockchain* from March 11, 2021. See https://bit.ly/3BXtrKf. David is a honest, well respected and lucid crypto critic, and his POV on NFTs (in fact, many of his observations around NFTs, as well as those by many others) have been pivotal in the process of conceptualizing Nina. Of course it does not tackle all the criticisms (such as, e.g. the CO_2 footprint of the technologies used to mint NFTs) as the focus is on the way NFTs themselves are created, not how they are distributed. Why? Because the NFTs generated using Nina are **platform agnostic** which means they do not necessarily require blockchain or DLT marketplaces for their distribution.

What is an NFT?

David mentions "[an] NFT is a crypto-token on a blockchain. The token is virtual – the thing you own is a cryptographic key to a particular address on the blockchain…" adding that an NFT "can contain a web address, or maybe just a number, that points somewhere else. *An NFT is just a pointer.*"

Not with Nina. NFTIs and NFTAs files are the NFTs themselves. The owner can store them in the digital media of their choice, there is no reliance in a third party for continuous access.

When I buy an NFT, what do I get?

In its current fashion, as David argues, you are "buying the key to a crypto-token. You're not buying anything else. An NFT doesn't convey copyright, usage rights, moral rights, or any other rights, unless there's an explicit licence saying so."

Nina allows the digital artist to uniquely link a cryptographic tag to the NFT itself (as it is "baked into" the NFTI or NFTA file) and hence explicitly associate contractual rights and covenants, if he/she so wishes, to a very specific piece of art. Such contracts do not come de facto: the artist has to set them up independently. The important thing to remember, once again, is the ability for marrying a contract to a clearly identifiable NFT (or series of NFTs) created by Nina. It therefore allows artists to have full DRM over their work.

Banksying the unbanksied: fraudulent NFTs

David writes "[T]here is no mechanism to ensure that an NFT for an artwork is created by the artist… you could create an *unlimited number* of NFTs that all claimed to be of a single particular work."

As said above, NFTs created using Nina embed a digital certificate into them. Forctis AG issues such certificates and will conduct KYC and other checks prior to assigning an ESF (Electronic Signature File) to any individual or entity, in the same way electronic signatures are issued by any DCA.

Recap

- Forctis has developed Nina, a new platform for digital visual arts distribution through new formats, called NFTI and NFTA for static and animated images, respectively.
- Both formats have been developed for digital art intended to be primarily curated as NFTs (non-fungible tokens). They provide a simple and effective means for artists to protect and manage their IP rights. In turn, investors in the digital artwork can enjoy the uniqueness of the piece they have acquired.
- It also enables the wider public to enjoy those creations, however limited to a degraded version of the original. The degradation is such that the artwork can be well appreciated in terms of its composition and chromatic palette, but the artifacts introduced make the rendered image unsuitable for applications (e.g. digital walls or reproduction).
- Those artifacts are highly unlikely to be satisfactorily removed using known techniques.
- Furthermore, the embedded encryption (using a dual set of keys) is unbreakable by known techniques.
- NFTI and NFTA files can be distributed either through decentralized platforms (e.g. minting an associated token) or using more traditional channels. In that sense, the format is platform agnostic.
- Both formats can be self-hosted. There is no need for a trusted third-party to intermediate in accessing the files.
- Our proprietary image viewer (to render NFTIs and NFTAs) would be free to use and update, with no license fees nor other restrictions imposed. We may license the rendering engine so that it can be incorporated to other popular image viewers.

Nina’s Roadmap

- DigiSign DCA technology for file or token certification is **ready and available**.
- Launch and availability of static image generator and viewer is in **advanced beta.**
- 8-bit and 24-bit JPG (JPEG) and PNG are currently supported. Other static image formats (e.g. TIFF) are scheduled to be supported by late H2 2021.
- Rendering of MP4 and GIF formats is also possible. We will add other formats used for animation, including VR, during H2 2021.
- Nina’s NFT file formats © by Forctis AG

  NFTI is the extension given to files generated for **static images**

  NFTA is the extension given to files generated for **animated images**

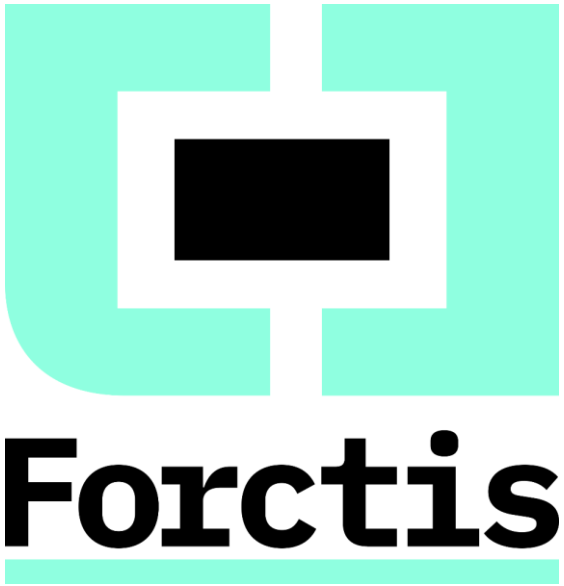
  We are also currently evaluating extending the technology for **audio recordings.** The planned extension for those files would be **NFTW.**

Why the name Nina?

Nina (Guillermina) Salazar was a unique teenager, and the daughter of our CEO Eduardo Salazar. She tragically passed away in January 2021, a few weeks short of her seventeenth birthday.

A polymath, Nina had a natural gift for both arts and sciences. She was an accomplished musician, and early on showed her talents for visual arts, particularly computer-aided designs. Nina also expressed a passion for other fields, such as computer science, veterinary and marine biology. Perhaps more importantly, she was an incredibly caring soul who, despite her own struggles, positively touched the lives of all those who she met during her lifetime. She is, and will be, incredibly missed. Our world (a cruel, unforgiving place for many teenagers) has forever lost an incredibly talented human being.

Eduardo created this software suite as a gift to the memory of his daughter, believing her talents for digital art made it appropriate. Forctis AG agreed to name it Nina, on his request.



https://forctis.io

For any queries, please contact us at info@forctis.io

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