



NANOG 86

Keynote Presentation, by Harlan Stenn
Project Manager: NTP Project
President/Founder: Network Time Foundation

Me, NTP, The NTP Project, and Network Time Foundation

How We Got Here: Welcome to my Hallucination



Hallucination?

“There are only two distinctions between anybody in this room and an institutionalized schizophrenic: (1) whether you have a good reality strategy and you can make that distinction, and (2) whether the content of your hallucination is socially acceptable or not. Because you all hallucinate. You all hallucinate that somebody's in a good mood or a bad mood, for example. Sometimes it really is an accurate representation of what you are getting from the outside, but sometimes it's a response to your own internal state.”

“Frogs into Princes”, by Bandler and Grinder, 1979-01-01, Real People Press



Hallucination: an experience involving the apparent perception of something not present.

Delusion: an idiosyncratic belief or impression that is firmly maintained despite being contradicted by what is generally accepted as reality or rational argument.



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Delusion: an idiosyncratic belief or impression that is firmly maintained despite being contradicted by **what is generally accepted as reality or rational argument.**

“A lie is a lie, even if everybody believes it,
and the truth is the truth even if nobody believes it.”



Hallucination? Delusion?

Hallucination: an experience involving the apparent perception of something not present.

Delusion: an idiosyncratic belief or impression that is firmly maintained despite being contradicted by **what is generally accepted as reality or rational argument.**

“A lie is a lie, even if everybody believes it,
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Communication is the effect it has on other people.





TotSF Clip Credit

The previous clip is from “Trail of the Screaming Forehead” which was released on 2007-06-08. Written and Directed by Larry Blamire. Fair use aside, Larry gave me explicit permission to use this clip as long as I gave credit.

Thanks, Larry!



Appropriate Language for this talk...

No sexual innuendo.

Somebody once told me that a “sexual innuendo” was an Italian suppository.



No sexual innuendo.
No violence.

Appropriate Language for this talk...



Appropriate Language for this talk...

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No violence.

Instead of saying “two birds with one ...” the phrase:

“Feed two birds with one scone” might be more “correct”.



Appropriate Language for this talk...

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Instead of saying “two birds with one ...” the phrase:
“Feed two birds with one scone” might be more “correct”.

But what about gluten-intolerant birds?

It can be quite a challenge to titrate the boundaries.

So very many things involve titrating the boundaries...

Before we can do this, we must be aware of the boundaries!



The Goals for NTP

NTP is all about a well-defined response to an “impulse”.

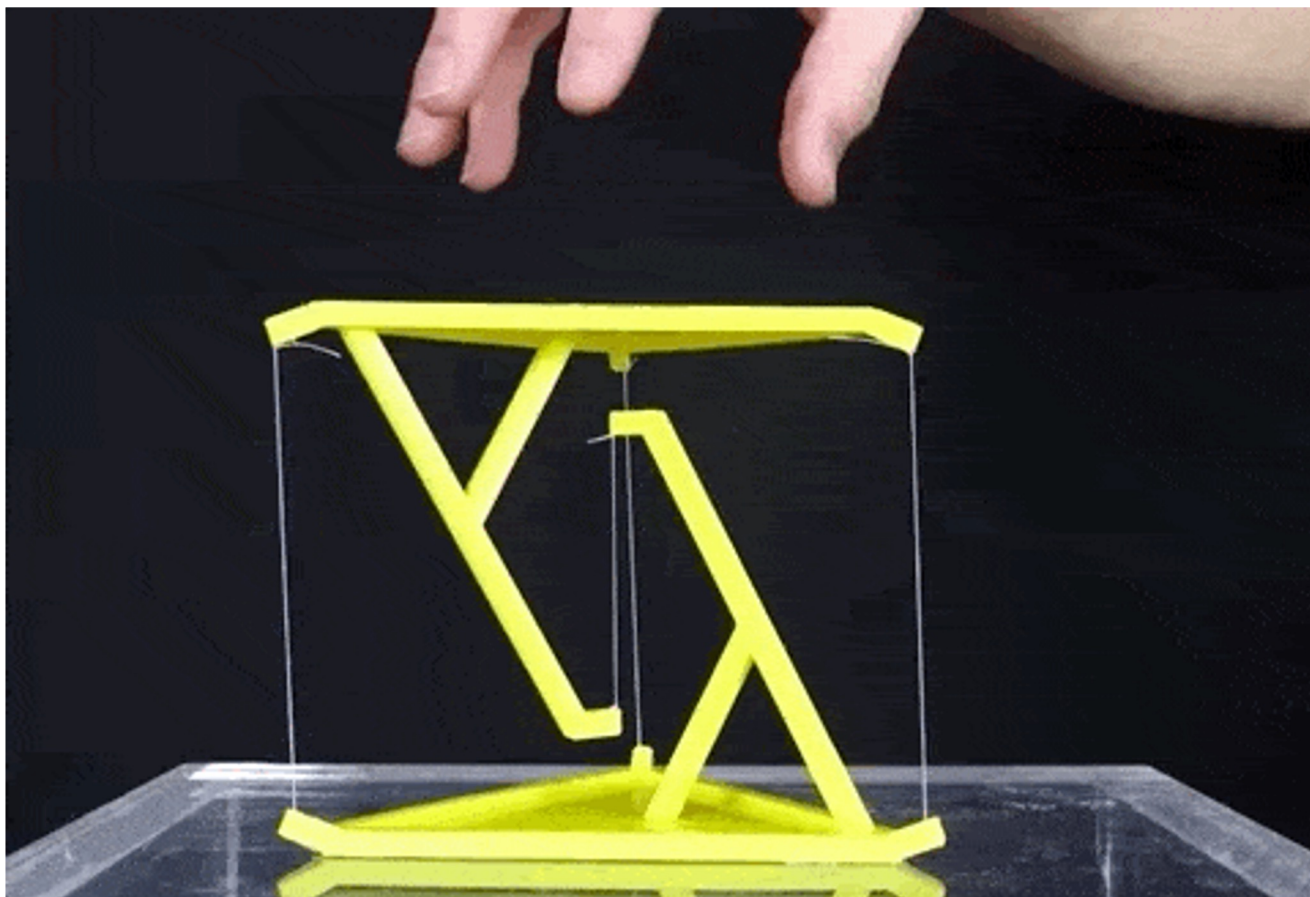
The impulse is ANY adjustment to time.

A big change or a small adjustment.

- Do the right things ...
- ... in the right places
- Not too much
- Not too little

Easy, right? The devil is in the details...

GIF courtesy of Popular Mechanics





The 1960s

- Hypervigilant
- **Great** memory
- Never overflowed my mental push-down stack, context switching is easy, great sense of musical time
- Read LOTS of books
- Began taking piano lessons
- Piano lessons soon included music theory
- Added oboe
- Added string bass

While I didn't know it at the time, my music studies were tweaking my pattern-matching skills, and I was also developing my intuitive skills.



1970-1974

- Still hypervigilant, still have a **Great** memory, still have a deep push-down stack, the ability to context switch, and have great musical timing
- Read LOTS of books
- Amped up cooking and baking
- Dropped oboe
- Started programming (PDP-8/S)
- Added electric bass (Jazz band)
- Dropped string bass, added trombone
- Stopped taking piano lessons, kept studying music theory
- Started reading the books by Castaneda
- Therapeutic massage (giving/receiving) is good
- Got my first professional coding job
- Decided to strive for perfection



Sayings...

Came up with my first memorable (to me) saying:

- Blessed are those who get what they deserve.



1975-1978

- Still hypervigilant, still have a **Great** memory, still have a deep push-down stack, the ability to context switch, and have great musical timing
- Read LOTS of books
- Amped up cooking and baking
- Karate, and then Tai Chi!
- Therapeutic massage (giving/receiving) is good
- Programming in the summer, student from fall-spring
- 3rd year undergrad:
 - Programming on the COmputer STored Ambulatory Record project
 - Studied the Chinese language (language is pattern matching!)
 - Took some calculus classes (math is pattern matching!)



Sayings...

- Blessed are those who get what they deserve.
- An ounce of prevention is cheaper than a pound of cure.



1979-80

- Still hypervigilant, still have a **Great** memory, deep push-down stack, easy context switch
- Read LOTS of books
- Amped up cooking and baking
- Kept giving/receiving therapeutic massage
- Evolving my programming and design skills changes the way my brain does “parallel processing” which costs me my musical tempo skills
- Many of the doctoral and post-doc students in grad school are also bakers, and I start tweaking cheesecake recipes
 - Baking and eating 3 cheesecakes per week for a while...



1980-1981

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- Project lead for a big hospital's clinical laboratory computing department, start submitting proposals to the relevant language standards group



1982-1991, #1

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
- Read my first Daniel Pinkwater books, started collecting them
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- I take over a client/server hierarchical database implementation, doing massive cleanup and portability work on it. Also added lots of new features



1982-1991, #2

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
- Read my first Daniel Pinkwater books, started collecting them
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- Got Good at porting and writing portable C code - stopped counting how many systems I ported the DB code to once I hit more than 400 different (mostly) Unix platforms from over 70 different hardware vendors
- Got introduced to a great “personal growth” training company
- Instead of striving for perfection, I now strive for excellence

Epiphany: A tiny change in perspective can produce a huge change in perception



1992-1994

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- Doing what would become known as DevOps for a radiology treatment company whose software ran on a good number of systems where builds on NFS required synchronized time, I started submitting patches to NTP.
- Got tired of editing the `Makefile` and `config.h`, so I offered to convert NTP to `autoconf` and `automake`. Dave accepted my offer :)
- Studied Myers-Briggs
 - I'm an iNtuitive/Perceiver. Most managers are Sensing/Judgers.



1994-1997

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- Finally studied kinesiology and energy work
- First Hakomi training, including Fractals and General Systems Theory
- Fractals, General Systems Theory, NTP, and NIST

The “Powers of Ten” clip at <https://www.youtube.com/watch?v=0fKBhvDjuy0> is a nice example of zooming in and out via fractals

Book: “Influencing With Integrity” by Genie Laborde, PhD



1998-2002

- Still hypervigilant, still have a **Great** memory, deep push-down stack, and easy context-switching
- Still doing lots of reading
 - Peter Senge: The Fifth Discipline
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- First source-code manager for NTP, CVS
- Switched from CVS to BitKeeper. Awesome.
- EOL for ntp-3, production releases of ntp-4
- How can we make it easier for people to support the NTP Project?



The Fifth Discipline: The Wall

Nothing undermines openness more surely than certainty. Once we feel as if we have "the answer," all motivation to question our thinking disappears. But the discipline of systems thinking shows that there simply is "no right answer" when dealing with complexity. For this reason, openness and systems thinking are closely linked.

A simple exercise we have used in our leadership workshops for many years gets at the central point. We cover a large wall with blank paper, and then ask the group to work together to map out all the feedback relationships in a particular problem with which they are wrestling. "For instance," we might say, "let's create a systems diagram to figure out how to balance our work and family responsibilities." We usually start by identifying key variables and writing them on different parts of the large paper: time pressures; expectations of oneself; responsibilities; personal interests; career goals; distance between work and home; and so on. Then we begin suggesting feedback links: expectations influence career goals; distance between work and home influences time available for family; personal income influences independence, as well as budget. Within a half hour, we've covered the wall with circles and arrows. Everyone in the room feels overwhelmed, and yet we know that we've just begun to show the hundreds of interrelationships that exist in the real system. People gradually come to realize that no one could possibly come to figure out all these interactions.

This realization has a remarkable impact on people. Some try to rationalize it away: "Well, this is so obvious it's meaningless," they say. "What's the point?" Others insist that, given enough time, they could eventually figure it out. Some diehards keep trying to add links and loops. But those who can face the "un-figure-out-able-ness" of it all will often sit back in their chairs, laugh, and realize some spring has sprung.



2002: The PTP Standard

- The first PTP Standard was IEEE 1588-2002
- Work on PTP is based on work started in the late '80s at HP, and continued at Agilent Technologies (per a slide by Calnex that I found)
- PTP started off doing time sync on a bus.
- Expanding to LAN
- PTP switches are pricey - a good 100x more per port than a normal (copper) network switch. Or fibre. Each PTP switch in the path seems to add significant jitter. At least, the last time I checked.



2002-2004

- Less hypervigilant, still have a **Great** memory
- Push-down stack not as deep, and context-switching is not as easy
- Doing less reading
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- 3 major NTP releases
- Andiamo/Cisco build toolchain contract



2005-2010

- Still have a **Great** memory
- Push-down stack not as deep, and context-switching is not as easy
- Doing less reading
- Still cooking and baking
- Kept giving/receiving therapeutic massage
- Road trip!
- ISC
- Several additional contract jobs
- Moved to southern Oregon



Sayings...

- Blessed are those who get what they deserve.
- An ounce of prevention is cheaper than a pound of cure.

There are a number of sayings on the theme:

- Pay me now, or pay me later.
- TANSTAAFL.
- You can't make an omelette without breaking some eggs.

I am liking:

- There will be suckage.



Sayings...

- Blessed are those who get what they deserve.
- An ounce of prevention is cheaper than a pound of cure.
- There will be suckage.

- I am always happy to work with people of good character, who are competent and collaborative.



Sayings...

- Blessed are those who get what they deserve.
- An ounce of prevention is cheaper than a pound of cure.
- There will be suckage.
- I am always happy to work with people of good character, who are competent and collaborative.

The concept of the Signal-to-Noise Ratio is very useful.

I become mindful of what I call:

- The Information-to-Attitude Ratio



2011-2022

- Pretty good memory
- Push-down stack not as deep, and context-switching is not as easy
- Doing much less reading
- Still cooking and baking
- Still giving/receiving therapeutic massage
- Founded Network Time Foundation
 - NTP Project, Ntimed, now also Khronos
 - LinuxPTP, now also some SyncE
 - General Timestamp API
 - Consortia



Taoist Farmer Story

There was once a farmer who had a horse. “You are so lucky to have a horse to help you!” his neighbors said. “Maybe,” the farmer replied.

One day the horse got loose and ran off. “Oh no! What misfortune!” his neighbors cried. “Maybe,” the farmer replied.

A few days later the horse returned, bringing six wild horses with it. “How fantastic! You are so lucky!” his neighbors told him. “Maybe,” the farmer replied.

While breaking-in one of the wild horses, it kicked out and broke the farmer’s son’s leg. “Oh no! Such bad luck, all over again!” “Maybe,” the farmer replied.

The next day soldiers came and took away all the young men to fight in the war. The farmer’s son was left behind. “You are so lucky!” his neighbors cried. “Maybe,” the farmer replied.



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Thank you!



How long is a day?

For very long time we've known a day is 24 hours' long. With 60 minutes per hour and 60 seconds per minute, that comes to 86,400 seconds per day.

It hasn't been all that long since we've had the ability to accurately measure time to the point where we knew that there was "jitter" in the length of a day.

Once we had that ability, several groups of people wanted to be able to track this information, and to predict it.

That's where International Earth Rotation Service, IERS.org, comes in. Bulletins A and B go to tracking the jitter, and <https://iers-conventions.obspm.fr/content/tn36.pdf> contains the current list of recognized **predictable** components of the jitter. Every time they add another component to this list that means somebody has teased "signal" from the "noise". That document is currently 179 pages' long.

There are unpredictable items too, including things like the speed and direction of the jetstream in the northern hemisphere and the circumpolar currents in the southern hemisphere. Also volcanoes, earthquakes, and tidal waves.



Timestamps

There are ongoing discussions about leap seconds, and whether or not they should exist.

I strongly support the notion that there should be robust “mechanism choices” that allow groups to implement their “local policy choice”.

I also firmly believe that if a group of folks are using a mechanism and they are satisfied with it, then that mechanism should be LEFT ALONE, and folks who want to install a new/replacement mechanism should do so in a way that does not break things for existing users.

IMO, POSIX really messed up when they punted on the issue of leap seconds. As soon as we can, I want to “turn on” the General Timestamp API project at NTF. It’s the result of several decades of paying attention to what folks want out of timestamps, and how, with a bit of altitude on the problem, we can come up with something that will actually be useful in a wide variety of use-cases.



Timescales

There are reasons why folks choose to use the timescale that they're using. The reasons may be good and/or bad.

It may be that the choice is made for us.

POSIX has specified a UTC timescale that ignores leap seconds, and this causes problems for different groups. Forcing a change here will, IMO, just create different problems. The GTSAPI (in the previous slide) is one way to address this.

There are a wodge of timescales. It might not matter if it's an imperial wodge or a metric wodge. <https://www.ucolick.org/~sla/leapsecs/timescales.html> has a good list of these. There are several "Earth Rotation" scales, some of which have lots of subtypes. There are several "Dynamical" time scales, with different subtypes. Also Atomic, Terrestrial, and various coordinated timescales.

The people who did each of these did so for very good reasons.

Forcing people to use a timescale they don't want to use is, IMO, suboptimal. Damaging, and unnecessary.