Phishing Attacks

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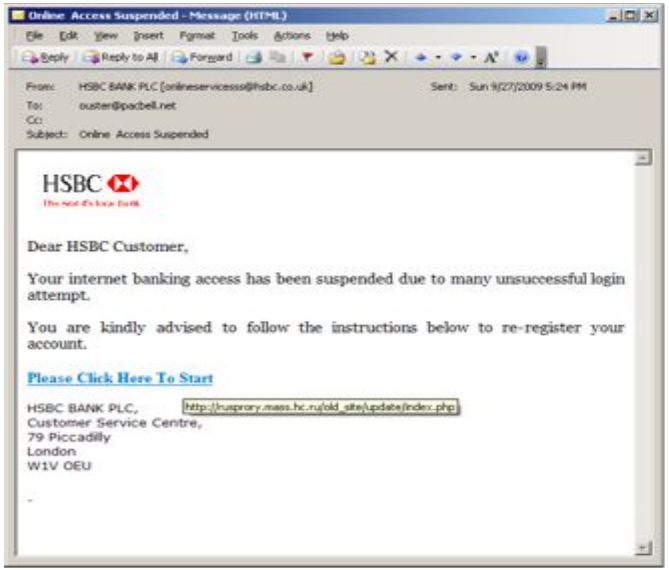
Phishing

- Basic idea:
  - Get unsuspecting users to visit an evil Web site
  - Convince them that the evil Web site is actually a legitimate site (such as a bank or PayPal)
  - Trick the user into disclosing personal information (password, credit card number, etc.)
  - Use the personal information for evil purposes such as identity theft.
- How to attract users?

Emails


Online Access Suspended - Message (HTML)
File Edit View Insert Format Tools Actions Help
Reply Reply to All Forward
From: HSBC BANK PLC [onlineservicesss@hsbc.co.uk] Sent: Sun 9/27/2009 5:24 PM
To: ouster@pacbell.net
Cc:
Subject: Online Access Suspended
HSBC
Dear HSBC Customer,
Your internet banking access has been suspended due to many unsuccessful login attempt.
You are kindly advised to follow the instructions below to re-register your account.
Please Click Here To Start
HSBC BANK PLC,
Customer Service Centre,
79 Piccadilly
London
W1V OEU

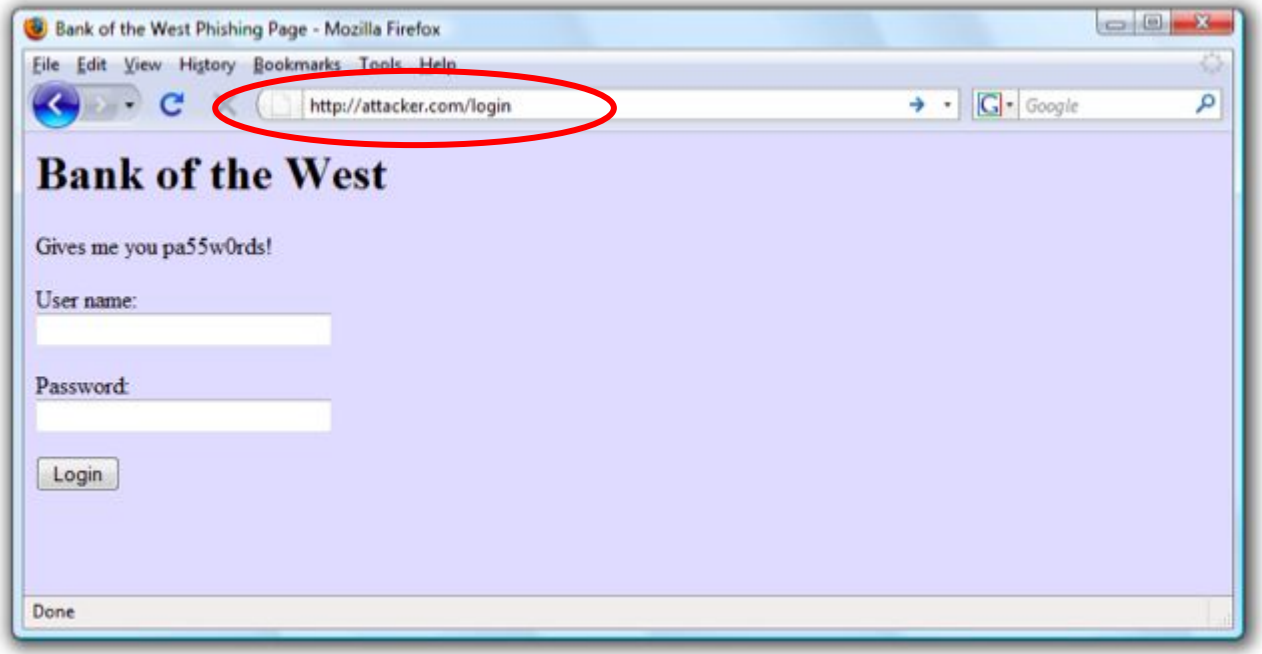

PayPal
informations concernant votre compte:
PayPal Chers membres:
Attention! Ton Compte PayPal a été limité!
Dans le cadre de notre sécurité mesures, nous écran régulièrement activité dans le PayPal d'apprendre récemment après contact avec vous remarqué une question sur votre account.We demandé des informations de votre part pour la raison suivante:
Notre système détecté inhabituels à une carte de crédit liée à votre Compte PayPal.
Numéro de référence: PP-259-187-991
C'est le dernier rappel pour vous connecter à PayPal dès que possible. Une fois vous vous connectez, vous sera fournie avec des mesures pour rétablir votre compte l'accès.
Une fois que vous vous connectez, vous sera fournie avec des mesures pour rétablir votre accès au compte. Nous vous remercions de votre compréhension pendant que nous travaillons à garantir compte la sécurité.
la protection de votre compte
protéger votre mot de passe
Cliquez ici ici pour activer votre compte

Spoofing legitimate sites

How to spoof the legitimate site?

- Copy HTML
- Include images from legitimate Web site
- Many links refer back to the legitimate Web site
- After collecting login info, log user into legitimate site, redirect to legitimate site
- User has no idea that password has been stolen

URL could be obviously Illegitimate



Or very subtly different: Look-alike characters

International Character Sets

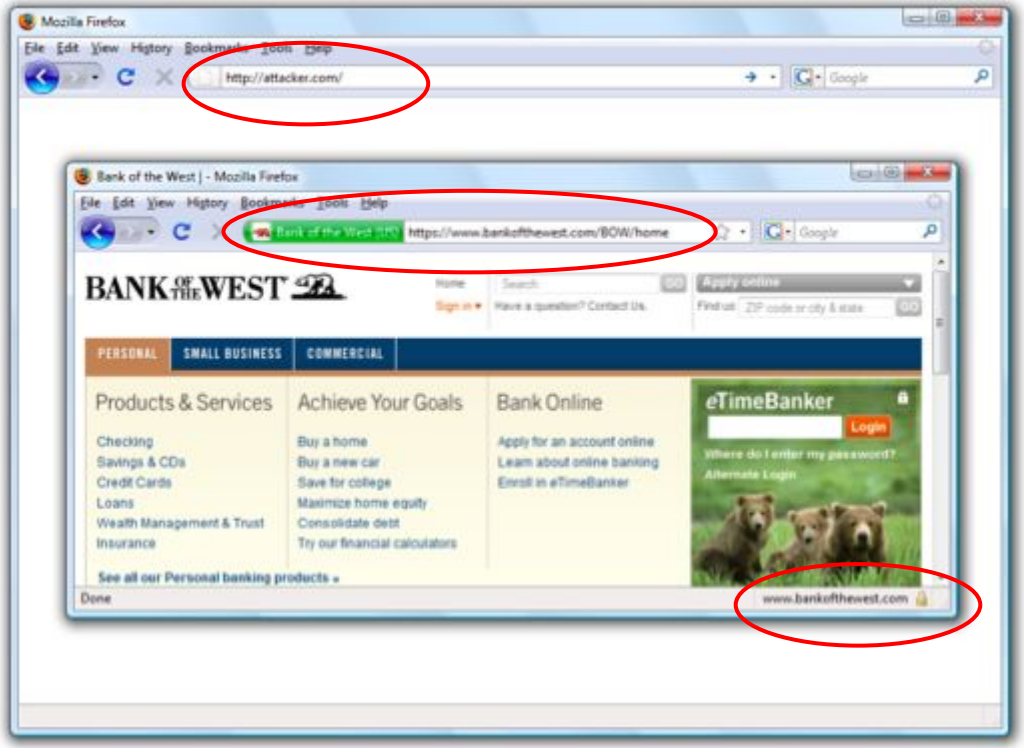
- What does this URL refer to:

www.bank.com/accounts/login.php?q=me.badguy.cn

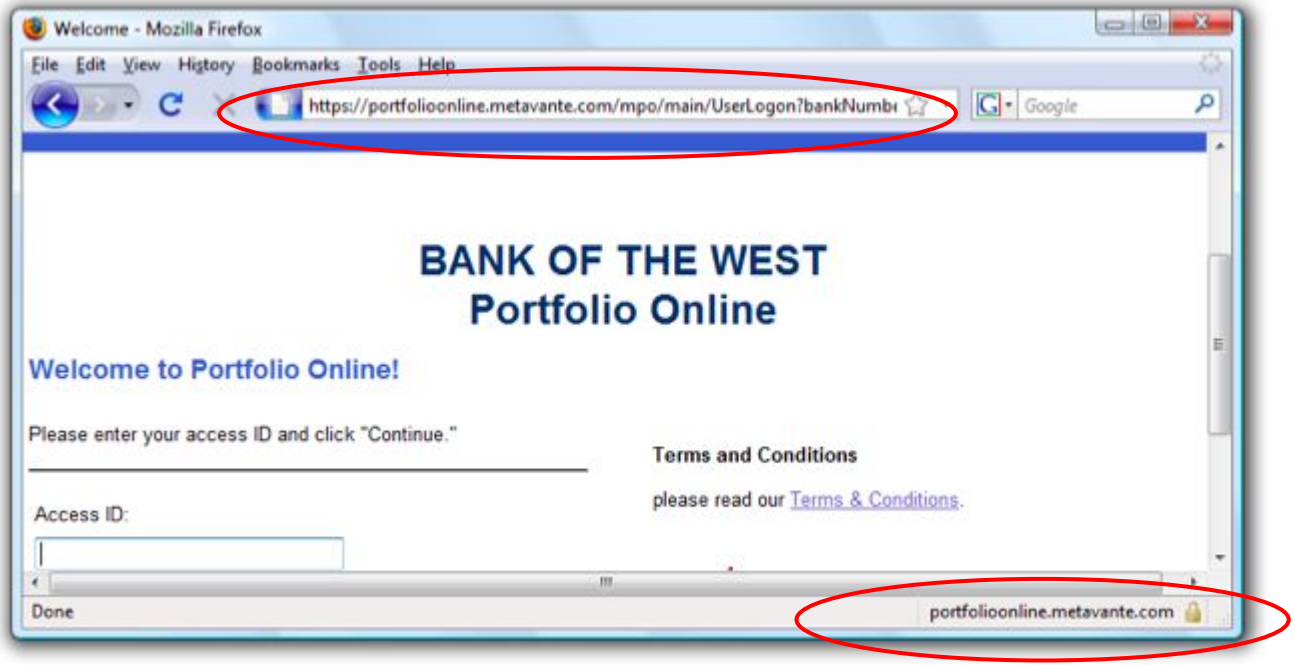
Chinese characters that look like "/", "?", and "="

- This is a host name only!

Picture in picture



Legitimate Partners Can Look Fishy



Counter-measure: visual indicators

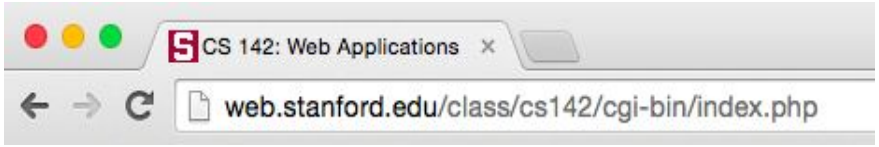
- Help users identify legitimate sites:
- Lock symbols to indicate HTTPS
  - Color change to indicate HTTPS

Problems:

- Lock symbols not always obvious

HTTPS Indicators

Chrome



Safari

Firefox

Problem: too easy to obtain certificates

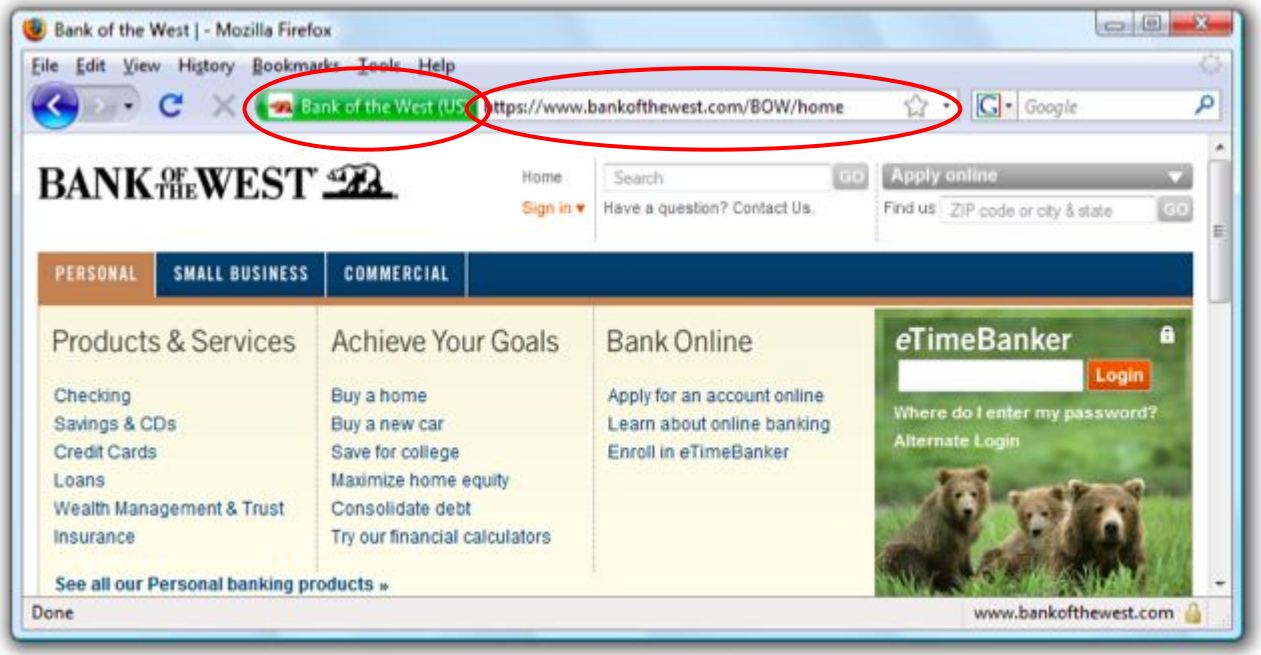
Problem: too easy to obtain certificates that look like legitimate sites

- Example: bankofamerica-secure.com
- Pressure on certificate authorities to issue certificates quickly
- E.g. "domain validation only" certificates: certificate authority only verifies that applicant has right to a particular Internet domain name; no verification of legal status of organization.

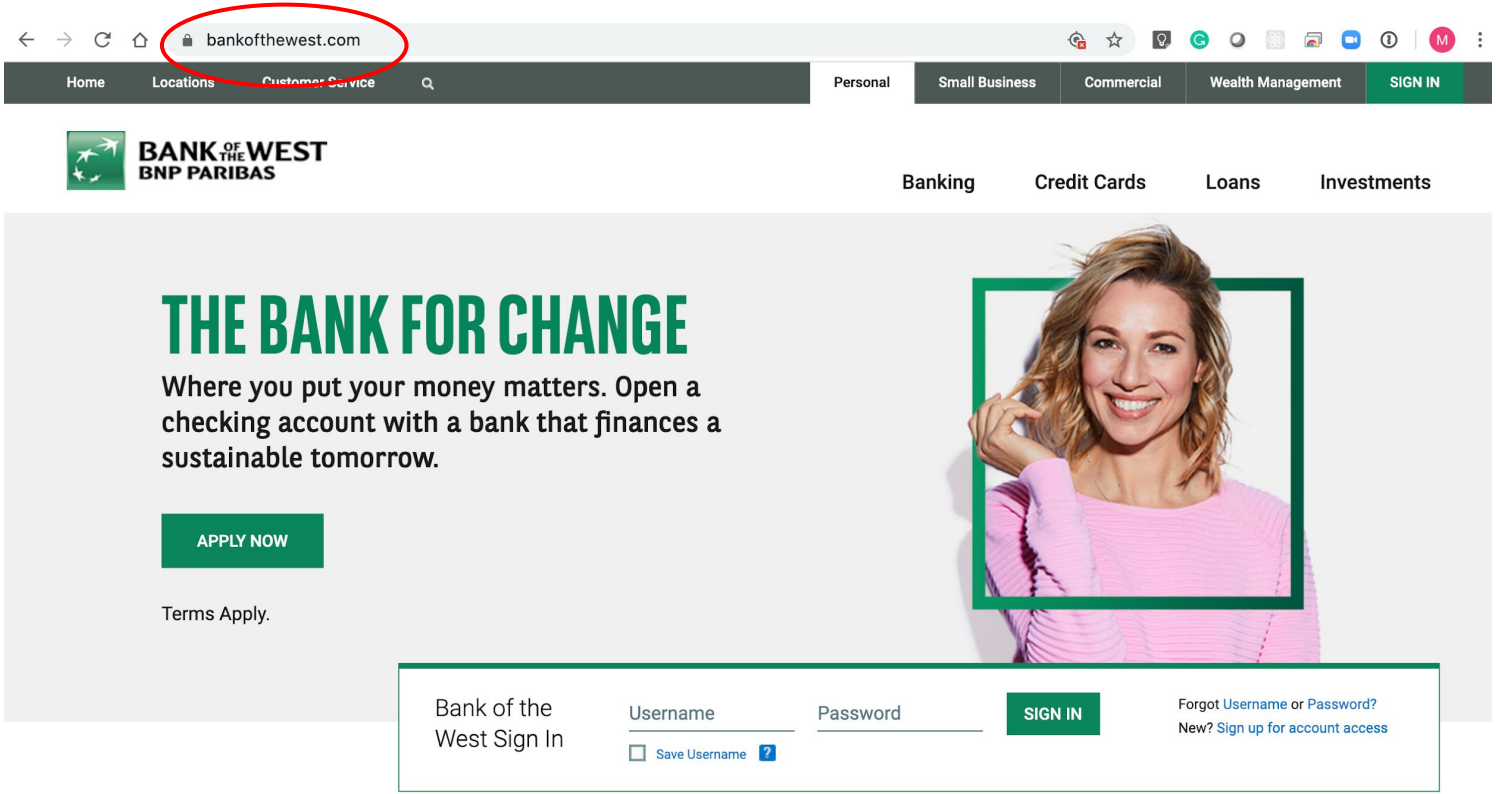
Counter-measure: extended validation certificates

- Goal: prevent attackers from obtaining certificates that look like legitimate sites
- Certificate authority must thoroughly vet the organization obtaining the certificate; prevent look-alike names.
- Certificate authority must undergo audits to ensure it is doing the vets carefully.
- Browser provides special indicator for extended validation sites
- Problems:
  - Small organizations don't like delays and cost of extended validation
  - Browsers are getting rid of indication of HTTPS (including extended) since everything has it.

Extended Validation Certificates a few years ago



Extended Validation Certificates today



Other counter-measures:

- Browsers starting to include anti-phishing measures (warn users about known phishing sites)
- Legitimate Web sites can monitor traffic; changes may indicate attacks under way:
  - Spike in download rates for official images
  - Unusual rate of password changes, funds transfers
- Legitimate sites can incorporate personal information in emails to authenticate them: phishers won't have such information.
  - **Spear phishing** - Phishing with attacker having personal information

Other issues

- Legitimate Web sites often use deceptive techniques to get users to click through ("your last chance for ..."), which reduces distinction between honest and dishonest sites.
- Education ineffective against phishing: response rates to phishing e-mails comparable to those for "legitimate" commercial e-mail.
- Warnings about shady certificates are ineffective: people just click through.

Two examples in the news

- Snapchat divulged employee information in phishing attack
  - “Last Friday, Snapchat’s payroll department was targeted by an isolated email phishing scam in which a scammer impersonated our Chief Executive Officer and asked for employee payroll information, …
- Stanford staff member and student got an email with a Word doc they opened
  - Word doc contained a macro that encrypted the user's home directory and provided instruction how how to buy the encryption key.
    - **Ransomware**
  - Memo: Stanford won't reimburse you for paying ransoms